WIN A SONY HIT-BIT MSX

Canada	C$	4.00
Denmark	DKr.	35.00
France	Fr.	50.00
Germany	DM	8.50
Greece	Drs.	290.00
Holland	DFl.	8.50
Italy	L	4200
New Zealand	NZ$	3.70
Singapore	M$	6.25
Spain	Pts.	390.00
Switzerland	SFr.	7.00
U.S.A.	$	3.95

(D72163)

90p

YOUR COMPUTER

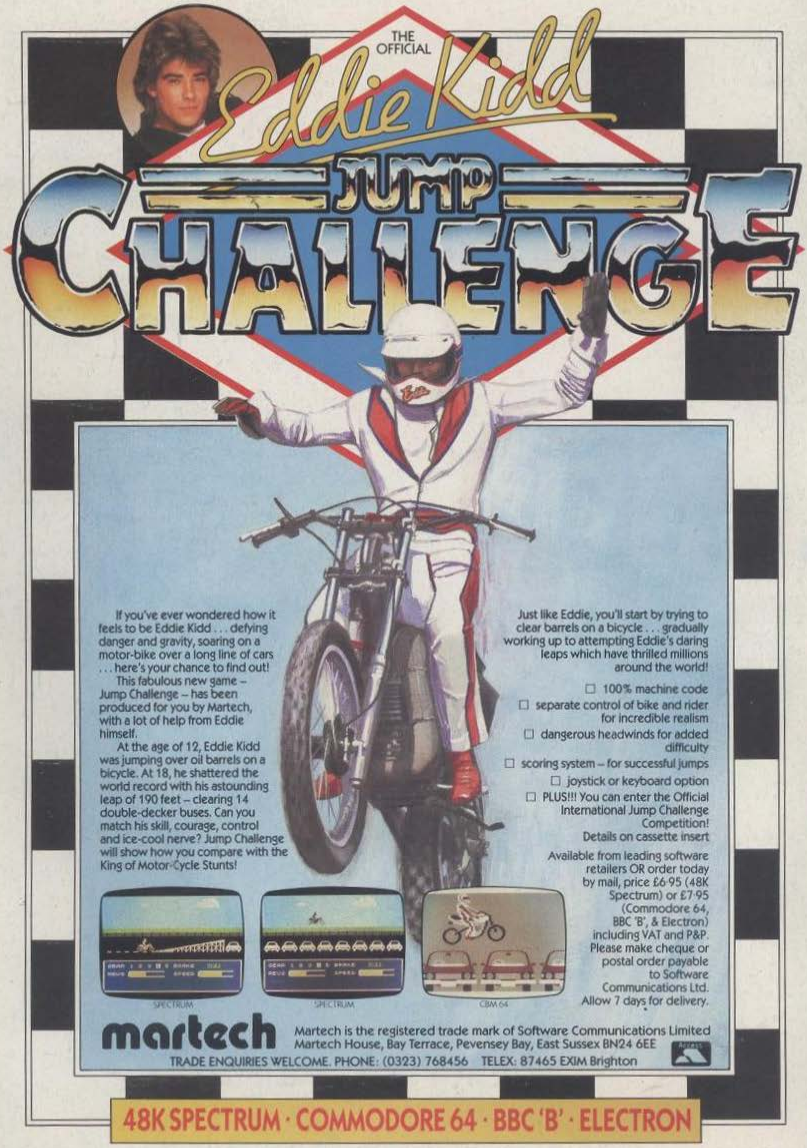
NOVEMBER 1984 BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE Vol. 4 No. 11

PIRACY: Are you guilty of stealing £100,000,000?

NEW SINCLAIR Details inside

MSX — Goldstar v. Canon, Sony and Mitsubishi
BBC Music, ZX-81 Red Ants and Oric Brood
CBM-64 Quick Load and Canyon
Spectrum Zoom and Multitask
Amstrad Word Processor

GAMES TESTS VIC-20, AMSTRAD, BBC

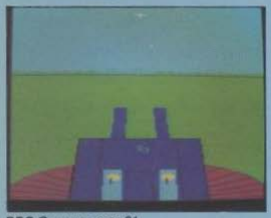

THE OFFICIAL
Eddie Kidd
JUMP
CHALLENGE
If you've ever wondered how it feels to be Eddie Kidd . . . defying danger and gravity, soaring on a motor-bike over a long line of cars . . . here's your chance to find out!
This fabulous new game – Jump Challenge – has been produced for you by Martech, with a lot of help from Eddie himself.
At the age of 12, Eddie Kidd was jumping over oil barrels on a bicycle. At 18, he shattered the world record with his astounding leap of 190 feet – clearing 14 double-decker buses. Can you match his skill, courage, control and ice-cool nerve? Jump Challenge will show how you compare with the King of Motor-Cycle Stunts!
Just like Eddie, you'll start by trying to clear barrels on a bicycle . . . gradually working up to attempting Eddie's daring leaps which have thrilled millions around the world!
☐ 100% machine code
☐ separate control of bike and rider for incredible realism
☐ dangerous headwinds for added difficulty
☐ scoring system – for successful jumps
☐ joystick or keyboard option
☐ PLUS!!! You can enter the Official International Jump Challenge Competition! Details on cassette insert
Available from leading software retailers OR order today by mail, price £6·95 (48K Spectrum) or £7·95 (Commodore 64, BBC 'B', & Electron) including VAT and P&P. Please make cheque or postal order payable to Software Communications Ltd. Allow 7 days for delivery.
SPECTRUM
SPECTRUM
CBM 64
martech
Martech is the registered trade mark of Software Communications Limited
Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE
TRADE ENQUIRIES WELCOME. PHONE: (0323) 768456 TELEX: 87465 EXIM Brighton
48K SPECTRUM · COMMODORE 64 · BBC 'B' · ELECTRON

YOUR COMPUTER Contents

NOVEMBER 1984

New Sinclair — page 42.

MSX machines: page 62.



BBC Gunner: page 91.

40 **LETTERS AND EDITORIAL:** Basic is better; that was the bodge that was.

42 **NEWS:** New Sinclair Spectrum Plus, Best music program yet and more.

45 **FIRST BYTES:** Speech synthesis and recognition; also robots.

49 **COMPUTER CLUB:** Lee Paddon gets a little tan in the Southend rain.

51 **SOFTWARE SHORTLIST:** Try for a third down; go on down with Deus Ex Machina; try landing your interdictor at base without getting shot down. Latest games.

55 **QUEST CORNER:** Hugo North leads adventurers through new mazes.

57 **VIC-20 SOFTWARE REVIEW:** Paul Bond pats the old workhorse.

59 **AMSTRAD SOFTWARE:** Paul Bond sees what's on the CPC-464.

60 **BBC SOFTWARE:** Simon Beesley finds the Beeb far from on the wane.

62 **FACE TO FACE WITH MSX MICROCOMPUTERS:** Glyn Moody gets to grips with the rigid uniformity of Japanese MSX machines, plus a Korean interloper.

67 **THE YOUR COMPUTER GUIDE TO MICRO BUYS:** What microcomputers are around, what will be around shortly — alledgedly. A guide for computer consumers.

73 **PIRACY — THE BLACK FLAG:** Meirion Jones sets the scene for a tale of skulduggery, greed and treachery. What the big companies are really afraid of.

74 **PIRACY — CONFESSIONS OF A HACKER:** A darkened studio, heavily backlit. Our man in the hood reveals some of the tools and tricks of the black art.

76 **PIRACY — DEATH OF A SOFTWARE GIANT:** Was it piracy, or just bad business practice? Bruce Everiss on the last days in Imagine's bunker.

78 **PIRACY — COMMODORE CBM-64 QUICKLOAD:** Defend yourself, landlubber. Quickloads make it hard to pirate your programs, thanks to Andrew Caple.

85 **ALIQUID SIMPLEX:** Help Dr Hilfe with David Aspinall's Spectrum game.

91 **BBC GUNNER:** Tim Humphries draws a bead on the foe.

93 **VIC ELEVATORS:** They may have stopped making them, but your Vic-20 will soon be going up in the world with H Kaljouw's elevating game.

97 **ORIC BROOD:** P H Phoeng unyolks eggs-treme horror.

100 **CBM-64 CAVERN:** Into the chasm with Patrick Edmond.

106 **SPECTRUM ZOOM:** Mark Jones enables you to zoom in and get a close-up on any section of your screen display.

109 **BBC MUSIC:** Allows you to enter the notes on the staves and then play them. Get in harmony with Nick Lea.

115 **THE DRAGON CURSE OF ABU SIMBEL:** A voyage into the city of the damned. Mick Stevens is your bus conductor.

122 **AMSTRAD WORD PROCESSOR.** Move paragraphs around.

129 **ATARI ANIMATION:** Bring those spritely sprites to life.

133 **QL 68000 DISASSEMBLER:** The first in a series on machine code for the QL. Phill Holliday initiates you in the rites of the machine.

141 **ZX-81 ASSEMBLER:** Anthony Nwokoye allows you to enter machine code using Z-80 mnemonics.

147 **SPECTRUM MULTI:** Multitasking for your Spectrum. Now you can have an Every and After command like on the Amstrad, thanks to Richard Taylor.

153 **BBC RETROFITS:** John Dawson looks at add-ons for the Micro.

161 **COMPETITION:** Win a Sony MSX.

163 **ZX-81 RED ANTS:** Carlo Delhez helps you climb to the top of the heap. An absolutely vast maze, eleven times screen-size.

173 **RESPONSE FRAME:** Tim Hartnell helps you with bugs.

175 **SOFTWARE FILE:** Ten pages of software for most home micros.

203 **COMPETITION RESULTS:** Who won the Psion Organisers.

248 **DATEBASE:** Paul Bond rounds up micro events.

Fuller MICRO SYSTEMS

STILL THE BEST AVAILABLE

FDS KEYBOARD

Gold plate contact keys are used, guaranteed life of 10^6 operations

Tough ABS case.
225mm x 350mm x 65mm deep

It's easy to see why the FDS Keyboard is the best selling Spectrum keyboard in the world. This stylish, slim-line keyboard has been transforming Spectrums world-wide.
The keyboard contains all the graphic characters of your ZX Spectrum, plus additional function keys. It has 4 cursor control keys, an auto rub-out key, a separate key for full stop and comma, a full length space bar, shift keys either side and 2 function keys for direct entry into green and red E modes.
The FDS Keyboard has real individual contact switches and not a membrane like most other Spectrum keyboards on the market which are more expensive.
The case is easily adapted to allow the microdrive to fit inside along with the power supply.
Fixing is simplicity itself and no soldering or technical knowledge is required.

£49.95
+ £2.50 p&p

FD42 KEYBOARD

The FD42 keyboard is still a firm favourite when it comes to a low cost option for your ZX81 or Spectrum. It is now a "standard" to Sinclair users. Neatly presented in an attractive ABS plastic case it transforms the Sinclair computer into a useful professional unit, providing all the graphic characters of the ZX81 or Spectrum, with additional keys to aid the user. No technical knowledge is required for installation. **£29.95** + 80p p&p

SEE PRESS FOR EXHIBITION & CHRISTMAS OFFERS

RS232 PRINTERFACE – ROM based software. Versatile printer interface. Comes complete with instructions and lead. **£34.95** 80p p&p

CENTRONICS PRINTERFACE – As above but for parallel printer with CENTRONICS input. Lead can be supplied at £7.95. Further details upon request. **£39.95** 80p p&p

SOUNDSTICK – Sound amplifier and Kempston compatible joystick interface **£19.95** 80p p&p

THE MASTERUNIT

The Fuller Box can be bought separately for £29.95 and the Orator for £34.95 + 80p p&p

This is the ultimate games unit, containing not only the sound synthesiser from the Fuller Box but also the speech unit from the Fuller Orator.
It will probably be the only add-on you will need to buy after the Spectrum. We don't call this the Master Unit for nothing as it contains a Programmable Sound Generator, Joystick Controller, Beep Amplifier, Cassette Interface, Through Bus and 'Orator' Phoneme Voice Synthesiser plus a three-inch loud speaker and volume control.
Speech can be synthesised easily so that your micro can talk to you and play chords of music at the same time.
Directly accessible in Basic it is able to say anything you command using the keyboard or a games program.

£39.95
+ £2.50 p&p

PRE-CHRISTMAS OFFER

NORDIC KEYBOARDS U.K.

RANDLES ROAD, KNOWSLEY, MERSEYSIDE **TEL: 051 546 0486**

FULLER PRODUCTS ARE AVAILABLE THROUGHOUT THE U.K. AT ANY OF THE FOLLOWING DEALERS OR VIA MAIL ORDER - FROM TREMIVER LTD., 93a PACK LANE, BASINGSTOKE. TEL: 0256 69386 or CHESTER COMPUTERS BY MAIL, LINENHALL HOUSE, 88-90 WATERGATE, CHESTER.

U.K.

Spa Computer Centre, Leamington Spa.

Micromain, Dundee.

Edinburgh Computers, Edinburgh.

Microworkshop, Surrey.

Computer Vision, Cornwall.

LANCS

Bill Ginty's, Bolton.

Barrow Computer Centre, Barrow.

Cabin Computers, Bolton.

Central Studios Ltd., Southport.

Computer Base, Ashton-under-Lyne.

Computer World, Lancs.

Computers of Dale Street, Liverpool.

Elbee Computers, Colne.

Format Computing, Preston.

Multicoloured Microshop, Redcar.

Tempo Computers, Blackburn.

The Computer Shop (Morecombe), Morecombe.

The Computer Shop (Lancaster), Lancaster.

LONDON AREA

Square Deal, London.

Rother Camera, London.

Computers of Wigmore Street, London.

Buffer Micro, London.

Adams World, Edgeware.

Anirog Software Ltd., Dartford.

Cambridge Computer Store, Cambridge.

CHESHIRE

Computer Link, Chester.

Chester Software Centre, Chester.

Delta Micro, Macclesfield.

MIDLANDS/YORKSHIRE

Bowles Computer Store, Walsall.

Central Computers, Dudley.

Complec Computer Stores, Nottingham.

Dimension, Leicester.

Ericks of Bradford, Bradford.

Just Micro, Sheffield.

JRS Software, Worthing.

JCV Hi-Fi and Video Ltd., Warwick.

Harborough Home Computers, Leicester.

Micropoint, Lincoln.

Miles Better Software, Chadsmoor.

Microman, Crewe.

Micro Fun, Rotherham.

Northampton Home Computer, Northampton.

The Computer Store, Doncaster.

The Home Computer Shop, Northallerton.

The Software Centre, Derby.

The Software Shop, Birmingham.

Software City, Wolverhampton.

North Notts Computer Centre, Sutton-in-Ashfield.

Kokotoni Wilf

Kokotoni Wilf is an arcade adventure program whose undisguised intention is to steal the title of 'best arcade adventure program bar non' from Jet Set Willy. Kokotoni Wilf must recover all of the pieces of the legendary Dragon Amulet (which has been scattered through time) for his master the great magician Ulrich. Throughout the quest Wilf comes up against many dangers from huge Prehistoric Dinosaurs to hostile alien Robots; but the reward for recovering all of the pieces warrants the risk. The 48K program features a number of major advances over Jet Set Willy. The games designer, ELITE, stresses that each of the games 60 plus screens settings is genuinely high resolution as opposed to psuedo hi-res and doesn't require a title to explain what you're looking at. The Sprite characters are of cartoon quality and exhibit their own unique personalities. Impressive claims. Jet Set Willy fans will no doubt feel both sceptical and intrigued. Now they can find out for themselves!

Available September 15th for–

Spectrum 48K	@ £5.95 (Cass.)
Commodore 64	@ £6.95 (Cass.)
	@ £8.95 (Disc)

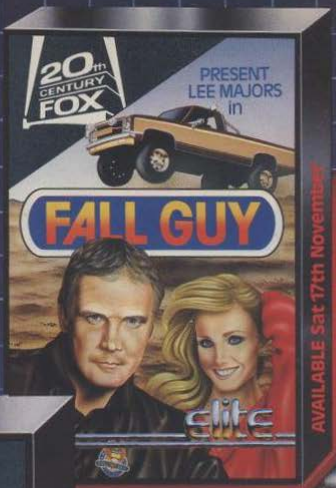
The Fall Guy

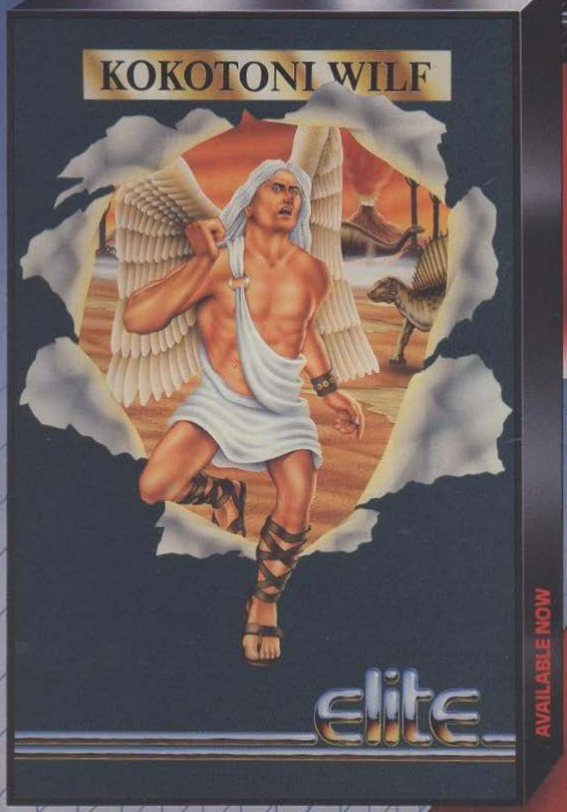
Colt Seavers is a top Hollywood stuntman who uses the extraordinary skills he displays before the camera when moonlighting as a modern Bounty Hunter, who apprehends and brings in Bail Bond jumpers. Colt is ably assisted by his would-be manager Howie, his beautiful stunt girl protege, Jody, and Terri the lady from the Bail Bond Company, who hires Colt when he's not before the cameras.

The cast of characters is:

Colt Savers	LEE MAJORS
Jody Banks	HEATHER THOMAS
Howie Munson	DOUG BARR
Terri Micheals	MARKIE POST

Available November 17th





Every single 'ELITE' product carries the unique 'ELITE' Holographic Sticker. Make sure your copy does, its your guarantee of quality.

48K Spectrum and Commodore 64

Mail Order: Just send a cheque or P.O. payable to 'ELITE' or quote your credit card no.

Elite Systems Ltd., 55 Bradford Street, Walsall, England WS1 3QD. Telephone (0922) 611215. Telex 335622 SPETEL G Attention: Elite

Peripheral perfection

No more fumbling with the game control keys, now you can have joystick control on the ZX Spectrum. The Kempston joystick interface allows all joysticks in the Kempston range (and others that are Atari compatible) to be used with the Spectrum. Simply plugs into the edge connector. No modifications necessary. **ONLY £11.50**

Compatible with ZX Interface 1 the Pro-Interface has three 9-way D Sockets. Two of the sockets allow compatibility with Sinclair/Psion software whilst the third offers the dual facility of both Kempston joystick software and cursor key software. The Pro-Interface also features a cartridge slot for ROM based software. **ONLY £19.95**

Maximum arcade quality features at a reasonable price. Features: □ Top fire button for one handed thumb control □ Trigger button for one handed index finger control □ Base fire bar for left or right handed control □ 8-way arcade quality leaf switches □ Rubber return action □ 1.5 metre cable. Commodore and Atari compatible. See joystick interface for Spectrum compatibility. **ONLY £12.75**

At last an RS 232 interface for the ZX Spectrum allowing connection to any printer which follows the RS 232 protocol. The interface has its own EPROM allowing the use of keywords LLIST, LPRINT and COPY. We recommend the Brother EP44 Printer for use with this interface. Interface complete with cable and connector. **ONLY £45.00**

The ultimate joystick for the home computer. Features: □ Ergonomic design and nylon covered steel shaft □ 8-way arcade quality leaf switches □ Dual fire buttons for left or right handed play □ Rubber return action for smoothness □ 1.5 metre cable. Commodore and Atari compatible. See joystick interface for Spectrum compatibility. **ONLY £13.50**

The Kempston centronics interface will allow you to utilise a vast range of printers with an industry standard centronics input port on the ZX Spectrum. **Interface E** has all operating commands held in an EPROM, so plug in and its ready to use. **ONLY £49.99** **Interface S** offering similar features as above but software routines are provided separately to initialise the interface before use. **ONLY £35.00**

KEMPSTON
MICRO ELECTRONICS LTD

Full details on all our products are available on request. S.A.E. please. Most products are available from WH Smith, Boots, Spectrum Computer Centres, good computer shops or direct. All prices include VAT and P & P. Please allow 21 days for delivery.

Kempston Micro Electronics Ltd., Singer Way, Woburn Road Industrial Estate, Kempston, Bedford, MK42 7AF
Tel: (0234) 856633 Telex: 826078 KEMPMI G

Trade Enquiries Welcome

Computers for Export

Sinclair
Oric
Commodore
Atari
Amstrad
Epson
Coleco

BBC
Sanyo
Microvitec
Apple
Apricot
MSX

Plus Printers, Disc Drives, Memory Expansion, Software

Quantity discounts available

No tax charge for equipment shipped abroad
Write for our price list or call our answer phone
01-686 6362

Galaset Ltd, 30 Bayford Road, Littlehampton, West Sussex, England. Telex 946240 Attn: 19001335

REGARDEZ

LANGUAGE LEARNING AIDS FOR FRENCH, GERMAN & SPANISH

FOR BBC(32K) · ELECTRON SPECTRUM (48K)

As used in numerous schools and colleges these programs provide a highly successful aid to modern language learning. Each cassette contains a sophisticated control program and a comprehensive series of vocabulary lessons which can be used in a variety of self-paced learning and test modes. Words, phrases etc are displayed with all necessary accents and special characters, different colours are used for masculine, feminine and neuter words to assist gender learning.

The programs are suitable for beginners, O-level and beyond as simple commands enable new lessons in vocabulary or grammar to be created by the user, edited as required, then permanently saved for later use. Invaluable for homework and exam revision!

Two cassettes are available for each language, together these contain a vocabulary of thousands of words: Level A provides 16 lessons in general subjects; Level B provides a further 16 lessons including adjectives, adverbs and fully conjugated verb lists.

Available from your computer store or by mail order Price £9.95
Also Available "ANSWER BACK General Knowledge Quiz" Price £10.95

CBM 64 VERSIONS AVAILABLE SOON

KOSMOS SOFTWARE

KOSMOS Software 1 Pilgrims Close, Harlington, DUNSTABLE, Beds. LU5 6LX
Telephone (05255) 3942

Please supply the following programs

The French Mistress Level A @ £9.95	☐	The French Mistress Level B @ £9.95	☐
The German Master Level A @ £9.95	☐	The German Master Level B @ £9.95	☐
The Spanish Tutor Level A @ £9.95	☐	The Spanish Tutor Level B @ £9.95	☐
ANSWER BACK Quiz (Senior) @ £10.95	☐		

I have a BBC/Electron/Spectrum computer (delete as necessary)

Mr/Mrs/Miss.....

Address.....

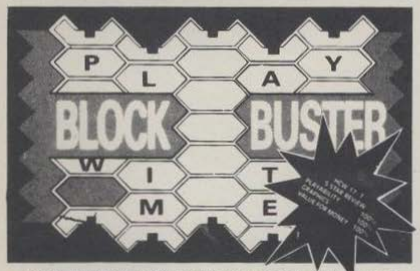
.....

..... Post code.....

I enclose a cheque/postal order for £_____ payable to KOSMOS Software

KOSMOS SOFTWARE DEPT YC10
1 Pilgrims Close, Harlington, DUNSTABLE, Beds. LU5 6LX

ADAPTED FROM THE POPULAR T.V. SERIES!!!



BLOCK—BUSTER is an exciting quiz game for ONE or TWO players and will appeal to a wide range of ages and skills with nine levels of play against the clock. The game tests speed of recall involving anticipation of the question as it 'unfolds' across the screen and speed of response dependant on the level of play.
BLOCK BUSTER is supplied with the FIRST ADDITIONAL QUESTION TAPE FREE to maintain the challenge of the game. Now available at good computer shops or direct with cheque/P.O. for £5.95 inclusive. ACCESS and VISA orders taken on our 24 Hour Hotline.

COMPUSOUND

DEPT HCW, 32-33 LANGLEY CLOSE, REDDITCH, WORCS B98 0ET
TELEPHONE (0527) 21429 (21439 24 Hr. HOTLINE)

Amazing how played out some things

become.

Will you think the same of your micro in 6 months' time?

Remember the days when every record player was gifted with a needle instead of a stylus. 45's were "in," 78's were "out."

Before the days of hi-fi and laser discs. When a graphic equaliser was a breakthrough on the football pitch instead of in music technology.

Look at a record player now and it's a museum piece.

It's like that with micros too. The machine you thought would give endless hours of fun and interest often becomes a five minute wonder. Played out within months. Or so you thought.

But imagine communicating with other micro users on a nationwide mainframe system. Updating yourself daily with the very latest computer news and reviews. Paging a special Bulletin Board. Feasting from Prestel's vast menu. Even downloading a choice of software *absolutely free.*

In fact, imagine 30,000 pages at your fingertips and you've imagined what it's like to be on line with the Micronet 800 system.

For Just £13 a quarter (and, for most of you, a local telephone call whenever you want to connect up) you could subscribe to the Micronet system.

The only extra you need to connect up is a modem unit. Which is a small enough outlay for what it buys.

Micronet's features are almost limitless and constantly updating so why not see it in action at John Lewis stores, selected W. H. Smith shops and Spectrum UK dealers.

Or fill in the coupon for our brochure.

You'll find you won't want to play on anything else.

Please send me the full facts about Micronet 800.

Name _____

Make/Model of Micro _____

Address _____

_____

_____

Telephone _____

MICRONET 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ. Telephone 01-278 3143. YC11

MICRONET 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ. Telephone 01-278 3143.

*Prestel and the Prestel symbol are trademarks of British Telecommunications.

Making the most of your micro.

University Software

UNISTAT

STATISTICAL PACKAGE

MULTIVARIATE REGRESSION: Main output consists of estimated coefficients, t-stats, standard errors, R^2, corrected R^2, standard error of regression, F stat, and Durbin-Watson stat. Further output options: multiple correlation matrix, var-covar matrix, ANOVA of regression, residuals, plot of residuals, interpolation. Data options: Log/ln option for each variable, no-constant regression, choice of dependent variable, selection of independent variables, auto-omission of linearly dependent variables.

ANALYSIS OF VARIANCE, SCATTER DIAGRAMS AND TIME SERIES PLOTS; One-way and two-way (without interaction) ANOVA tables, scatter diagrams of paired data and time series plots with auto-scaling.

STATISTICAL TESTS, CORRELATION COEFFICIENTS AND PROBABILITY DISTRIBUTIONS: Basic stats on each column of data (size, sum, mean, variance, std. dev.). Chi-square (contingency table), t (one sample, two sample, paired), F, Mann-Whitney U, and Wilcoxon signed rank tests. Pearson's, Spearman's rank and Kendall's rank corr. coefs. Chi-square, t, F, binomial, Poisson and normal (std., non-std.) distributions. Results of tests and corr. coefs are displayed with significance levels.

DESCRIPTIVE STATISTICS, FREQUENCY DISTRIBUTIONS AND HISTOGRAMS: Analysis of raw data or data with frequency counts. Raw data sorted and grouped. Choice of lower bounds and class intervals. Absolute, cumulative and relative frequencies. Histograms with up to 200 classes. Output displays sum, mean, mean deviation, median, variance, std. dev., 3rd and 4th moments, skewness, kurtosis, range, etc.

All programs are datafile compatible with Matrix Operations program in UNIMAX package. Data matrix capacity examples (columns by rows): **CBM-64;** 2x1250, 5x700, 10x380, **BBC-B;** 2x750, 5x400, 10x200. **48K Spectrum:** 2x1800, 5x900, 10x500. **CBM-64** (disk/cass): **£85**, **BBC-B** (disk/cass): **£85**, **48K Spectrum** (mdvcart/cass): **£60**

UNIMAX

LINEAR PROGRAMMING PACKAGE

LINEAR PROGRAMMING: A powerful and instructive optimisation program capable of handling all sorts of linear programming problems (min/max, any combination of <=, =, >= constraints and x_i>=0, x_i<=0, $-\alpha<x_i<\alpha$ sign constraints). Primal, canonical, dual and their solutions are displayed in standard mathematical form. Unbounded problem and no feasible solution prompts. Edit option for all inputs. Capacity examples (variables by constraints): **CBM-64;** 10x35, 25x30, 40x25; **BBC-B;** 10x25, 20x20, **48K Spectrum;** 10x45, 25x35, 50x25.

MATRIX OPERATIONS: Inversion, transposition, determinant, pre- and post-multiplication, scalar multiplication, addition and subtraction of matrices and vectors. Any output can in turn be used as the input of the next operation without re-typing. Matrices can be saved or loaded at any stage. Datafile compatible with **UNISTAT** package. Capacities: **CBM-64;** 35x35, **BBC-B;** 25x25, **48K Spectrum;** 45x45.

CBM-64 (disk/cass): **£60**, **BBC-B** (disk/cass): **£60**, **48K Spectrum** (mdvcart/cass): **£45.**

ALSO AVAILABLE FOR 48K SPECTRUM
INTRODUCTION TO ECONOMICS SET: £25
ECONOMIC GEOGRAPHY: £9.95 • BIBLIOFILE: £9.95
POLYNOMIALS: £6.95 • INTEGRATION: £6.95

To: **UNISOFT LIMITED**
(Dept. E) 29 ST PETER'S STREET, LONDON N1 8JP.
TEL: 01-359 0978

Prices include VAT and delivery within the UK. For orders from Europe add £1.50, outside Europe £3.00 per item for airmail post. Dealers enquiries welcome.

COMPATIBLE WITH sinclair ZX Microdrives

COMMODORE 64, BBC-B, 48K SPECTRUM
✻ Comprehensive user manual ✻ Full data handling facilities (display, print, change, save, load)
✻ All results can be printed out ✻

COMPATIBLE WITH sinclair ZX Microdrives

SUBSCRIBE TO BRITISH & AMERICAN

Computer magazines. Reach each month up-to-date information, New Products, Programming and understand more about computers.

BRITISH Magazines: Computer Answers-Input-Micro Decision-Personal Computer World-Personal Computer Games-Radio Electronics World-Sinclair Programmes-Sinclair Users-Your Computer-What Micro-Etc.

AMERICAN Magazines: Byte-Compute-Computers & Electronics-Creative Computing-Micro Computer-Micro Systems-Popular Computing-Small Business Computers-VIDEO Magazine, Etc.

Also NEW Books from all Publishers.

Service to all countries throughout the world.

Please write for prices.

Computer Magazines and Books
Haulsterm Ltd. 500 Chesham House, 150 Regent Street, London W1
Tel 01-778 8746 01-439 6288

Self Adhesive Cassette & Disk Labels

★ **24 HOUR SERVICE FROM STOCK**
★ **AVAILABLE WHITE OR TINTED**
★ **48 HOUR SERVICE ON PRINTED LABELS**

CASSETTE LABELS ON A4 SHEETS - White only, suitable for small-offset printing or photocopying: 100 labels - £3.50, 200 - £6.00, 300 - £8.25, 500 - £12.00, 1000 - £21.85

CASSETTE LABELS IN ROLLS - Complete with tractor feed backing paper for over-printing by computer printer. Available white or tinted blue, pink, green, orange, grey or yellow. Minimum order 500 labels.
WHITE: 500 - £14.66, 1000 - £20.70, 2000 - £31.05
TINTED: 500 - £16.90, 1000 - £24.15, 2000 - £37.95

DISK LABELS - Available in 127 & 95 mm width for conventional floppy disk (36mm deep), or 71 x 69mm for the MSX style compact floppy disk. These labels are all on tractor feed backing paper with a range of tints as above.
WHITE, 95mm: 500 - £12.75, 1000 - £17.75, 2000 - £20.56
TINTED, 95mm: 500 - £15.20, 1000 - £24.65, 2000 - £34.36
WHITE, 127mm & Compact disk: 500 - £15.55, 1000 - £22.05, 2000 - £25.70
TINTED, 127mm & Compact disk: 500 - £21.35, 1000 - £31.05, 2000 - £43.65

All Prices include VAT and postage/ packing
Excellent discounts for large quantities
Please send stamp for printing price lists and sample labels

Industrial Process

UNIT A4
SMEED-DEAN CENTRE
EUROLINK INDUSTRIAL ESTATE
SITTINGBOURNE
KENT ME10 3RN
Sittingbourne (0795) 28425

Self Adhesive Computer Labels — Superfast

adventure for commodore 64 and spectrum 48k

no.1 swords & sorcery

NEW RELEASE AVAILABLE 20th OCT

WIZARDS *power level 1 – 10*

DRAGON *power level 7 – 9*

LYTCH *power level 6 – 10*

WEREWOLF *power level 4*
a selection of your opponents

the MIDAS adventure concept

PSS

SWORDS & SORCERY

Swords and Sorcery represents the first example of the ultimate in graphic adventures using the unique MIDAS system.

Swords and Sorcery differs from other adventures in that you guide your character through the unending corridors of the underworld on a quest for material, physical and/or spiritual power. The choice is yours.

You begin as a novice with limited abilities in the use of magic, sword play and stealth (lock picking, thieving etc).

As you wander the corridors, you will encounter beings meek and mighty, discover untold wealth and worthless trash. Some objects will increase your powers, whilst some will be dangerous and still others will be protected from pilferers (you!) by friendishly ingenious traps, all designed to help or hinder you on your pilgrimage to power and glory.

There are questa within questa within Swords and Sorcery, for those who want to follow them. Some are given others must be found, and some are lost causes. There are many ways of opening the gate between the levels of the dungeons. Some are obscure and easy, others obvious and dangerous. The most profitable paths are both. The Ultimate goal of many will be to find the lost armour of Zob, which was un-made by its maker, and its parts scattered across the levels. What, where, how, who and why are answers to be found. All that is known is the prayer of the seekers:

WHEN DARK CABALLUS HIS COUNCILS LEND US
LET NOT THE RED CLUPEA HARANGUE US
TURN US FROM WHAT SEEMS TREMENDOUS AND
THUS TO ZOBS GREAT TREASURE SEND US.

You need never tire of Swords and Sorcery – when this dungeon can no longer hold you, the next awaits. . . there are a series of expansion modules planned to extend your enjoyment indefinitely.

Available on Cassette £9·95

SPECTRUM 48K OR COMMODORE 64

(Multi Dimensional Animation System)

MIDAS ADVENTURE CONCEPT

Stunning 3D graphic animation simulating video disk games.

A unique fully interactive adventure language using the latest ARTIFICIAL INTELLIGENCE techniques.

State of the art data compression techniques enabling enormous scenarious and vocabularies to be incorporated.

Real time Interactive Conflict Sequences.Talk to your opponent, attack them, flee them and even confuse them.

Joystick capability for movement, combat and actions through unique menu feature. Keyboard operation for more complex interaction with the adventure when time permits.

Develop your own unique player characters. For example – specialize in magic, swordplay etc.

Total expandability – your own characters can be transferred to future adventures and new opponents, scenarious and objects can be added to all the games. A series of expansion modules to increase indefinitely the playing life of each game written with MIDAS.

P.S.S. 452 STONEY STANTON RD. COVENTRY CV6 5DG. TEL: COVENTRY (0203) 667556

COMBAT LYNX

From DURELL
(Technical Support from Westland Helicopters)

Available now from most retail outlets
COMMODORE 64 – SPECTRUM 48k
Available soon
ORIC – BBC – AMSTRAD

DURELL sales dept., Castle Lodge,
Castle Green, Taunton, Somerset, TA1 4AB

ZX-81 OWNERS

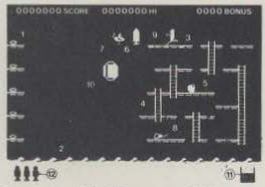
AT LAST THE PROGRAM YOU'VE BEEN WAITING FOR!

Rocket Man

with Hi-Res Graphics on standard ZX-81 16K

Coming Soon! SPECTRUM VERSION

Actual ZX-81 Screen Display!



1. Diamonds	5. Fuel Cans	9. Player
2. Sea	6.Rocket	10. Bubloid
3. Platforms	7. Vulture	11. Fuel Gauge
4. Ladders	8. Leg of Lamb	12. Men Remaining

Get rich quick by collecting Diamonds that are simply lying there waiting for you!

Oh . . . I forgot to mention that there are one or two problems! There is an expanse of Shark infested water between you and the Diamonds and a strange breed of Bubble that seems hell bent on getting you in it! Somehow you must cross it. . . .

You have a Rocket Pac to help you (a Vulture on higher levels) but you must rush around the platforms and ladders collecting cans of fuel (legs of lamb with the Vulture) and cursing that weird Bubble. Once you have enough fuel then it's Chocks Away!

Oh . . . but don't run out of fuel on the way – otherwise it's . . . . SPLASH!

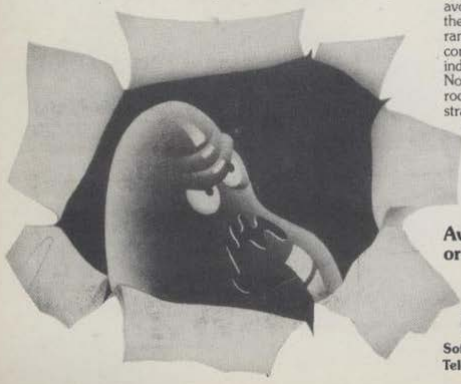
The aim is to collect all the diamonds from the far left hand side of the screen, whilst avoiding the rampant Bubloid. These emerge from the sea and are hell-bent-on returning to their watery habitat with you in tow. Sooner or later you are going to end up in the drink – The idea is to make it later!

By belting round the system of platforms and ladders, cleverly avoiding the Bubloid, you collect the fuel cans which appear in random positions, until you consider that your fuel gauge indicates sufficient in the tank. Now you can go and collect your rocket. With the rocket-pack strapped to your back you can fly across the expanse of sea to collect the diamonds . . . but don't run out of fuel or your rocket-pack will simply disappear and you will wind up in the drink!

There are six stages with six different platform layouts. On stages 1-3 the Bubloid, which floats in front of the platforms with uncanny ease, gets an ever increasing ability to home in on your position, making the task of staying alive more demanding with each stage. On stages 4-6 you once again start with the easiest Bubloid (which is a blessed relief!) but the fuel cans are replaced by legs of lamb which you must collect to feed your vulture, and once it has enough energy (or you think it has!) you must flap across the water on its back to collect the diamonds.

Extra men are awarded for every 10,000 points – but ONLY once you have collected all the diamonds and so completed each particular stage.

GOOD LUCK!



Available from all good computer shops or send cheque/P.O. for £5.95 (inc P&P) to:

Software Farm, FREEPOST (no stamp required) (BS3658) , BS8 2YY

Software Farm, 155 Whiteladies Road, Clifton, Bristol BS8 2RF. Telephone (0272) 731411 Telex 444742 AFMADV G

No man's land

ORIC/ATMOS

ORIC/ATMOS

OTHER TITLES FOR CBM64/VZ0 SPECTRUM ZX81 AVAILABLE ON REQUEST

0505 CATEG-ORIC (action game). Take command of a cruiser engaged in battle against fighter planes and submarines. Use the radar and sonar systems to detect and destroy the enemy before you are sunk. £ 7.95

0540 STYX (arcade). Destroy the castles of the Dark One which guard the river Styx. Struggle against vultures, the eyes of the devil and his minions to vanquish evil. £ 8.50

0494 DBUG (utility). A monitor/debugger to debug your programmes in machine code: position of internal registers, set breakpoints, step through programmes. £ 11.95

0496 OPTIMUM (home). Manage up to 4 different accounts, keep track of expenditure and compare with your monthly or yearly budget. Just what you need to keep the household accounts in order. £ 9.95

0495 FIRE FLASH (arcade). Prevent the aliens from sabotaging the fuel depot and avoid enemy fire by passing into hyper space. An attractive and challenging arcade game in 100% machine code. £ 8.50

0526 TYRANN (adventure). Can you find your way through the labyrinth and liberate Queen Tyrann from her torment? A first-class adventure game with text and graphics. £ 8.95

0514 THE DIABOLICAL TOWER (adventure). The Diabolical Tower has 60 floors, each one fraught with danger. Your mission is to seek out the treasure. £ 8.50

0510 MULTIFILER (business). A powerful programme for creating files. Choose your own criteria adapted to your requirements. Rapid sort and search features in machine code and possibility of memorising over 30000 characters. Extremely simple to use. £ 14.95

0463 PANIC (action). Catch the marauding apples by setting traps. 6 levels. £ 6.95

0515 THE HARE AND THE TORTOISE (education). A game for 3-8 year olds to teach the notions of right, left, up, down and counting. The hare and the tortoise decide to race. Who will win? The level of difficulty is adjustable to the child's ability. £ 8.50

HARD communications

THER ORIC/ATMOS TITLES

497	ADDRESS BOOK	£ 9.95
496	BANK ACCOUNT	£ 12.50
499	BASIC PLUS	£ 9.95
502	COMPUTER ASSISTED DESIGN	£ 8.50
504	CHARACTER GENERATOR	£ 8.50
465	CONCOURS HIPPIQUE	£ 5.95
464	CW MORSE	£ 14.95
506	FINANCIAL CALCULATOR	£ 9.95
507	INVOICING	£ 14.95
508	LEARNING FORTH	£ 16.95
509	LIBRARY CATALOG	£ 9.95
511	SCREEN KIT	£ 9.95
513	SUPERCOPY	£ 9.95

RETAILERS CONTACT:

CentreSoft

PCS DISTRIBUTION LIMITED

OR ASK YOUR DISTRIBUTOR TO CONTACT US

DISTRIBUTORS AND OVERSEAS ENQUIRIES CONTACT:

JANET PELTON, INNELEC-NO MAN'S LAND 110 BIS RUE DU GAL LECLERC 93506 PANTIN CEDEX FRANCE TEL.: 33-1-840.24.31.

MAIL ORDER:

POST COUPON TO HIGH TECH UNITS 1 & 2 CONLON DEVELOPMENTS WATERY LANE DARWEN LANCASHIRE

PRICES INCLUDE POSTAGE AND PACKING FOR UK ONLY OVERSEAS ADD £2.

REF	TITLE	QTY	TOTAL PRICE

PO/CHEQUE ENCLOSED OR DEBIT ACCESS/VISA

IF CARD EXPIRY DATE:

IMPORTANT: All cheques or cards payable to NO MAN'S LAND and sent to High Tech.

NAME

ADRESS

POSTCODE

YC

Home computers.

The report you've been waiting for: simple, factual, honest, comprehensive and 100% biased.

ALL you need to know about computers can be summed up in one word: Commodore. (Well, we did tell you this would be biased).

We make everything you'll ever need to get the most out of home computing: all the *hardware* and all the software. (And if you don't understand what that means, simply look under "H").

That's what these three pages are all about: explaining what computers are (without the scientific jargon), how they work (without any technical mumbo-jumbo), and how you can get more enjoyment out of them (without much difficulty).

BASIC. Most home computers speak the same language. It's called BASIC. This is a more friendly way of saying "Beginners All-Purpose Symbolic Instruction Code."

There are different kinds of BASIC and, like languages, some are a little easier to understand than others. Like, BASIC 3.5 in the *Commodore Plus/4* and *Commodore 16*.

BOOKS you can read: "Teach Yourself Computer Programming With The Commodore 64" and "Programmers Reference Guide."

CASSETTE. Just as you keep your favourite music on cassette, so you can also keep your favourite computer programs on cassette.

You can either buy pre-recorded programs in a shop, or you can write them yourself. Cassettes are just one form of program storage and playback – see also *Cartridges* and *Disk Drive*.

To play cassette software you need a cassette unit. The Commodore 1530 and 1531 cassette units have been specifically designed to get the very best out of our computers, and provide consistently reliable results.

CARTRIDGES. These are programs that plug directly into the back of the computer itself.

CPU stands for Central Processing Unit. This is the computer's "brain," and as such it's what does all the hard work.

CHIP: silicon. A very complex electrical circuit miniaturised in silicon. It carries out the functions in the computer. Unlike other home computer companies, we make our own chips, so maintaining quality.

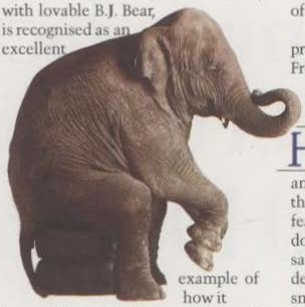
DISK drive. A program and data storage system, just like *cassettes*, but much faster. You can find and load the program you're looking for in seconds instead of minutes.

Diskettes, which can be used repeatedly for recording or re-recording programs, transfer information or instructions to and from the computer.

EDUCATION software from Commodore. We work non-stop with educationalists, improving our range of programs for the pre-school to "O" level age groups and beyond.

Computers are an invaluable educational tool – versatile, patient and able to present information in an exciting way.

Our "Get Ready to Read" series, with lovable B.J. Bear, is recognised as an excellent



example of how it is possible to develop reading and writing skills in pre-school children.

ELEPHANT: well-known symbol of the *Commodore 64's* enormous 64K memory. And don't you forget it!

FOUR is for Commodore Plus/4, our very latest home computer with four, very popular built-in programs: wordprocessing, spread-sheet (financial planning), database (filing), and graphics.

It has an extensive 64K memory, with an exceptionally large 60K available for use. The Plus/4 comes equipped with the Commodore BASIC 3.5 with over 75 programming commands.

Other features include sound facilities, comprehensive graphics and 121 colours.

GORTEK and the Microchips is a unique programming course, for children of all ages, that links learning exercises with a space adventure story.

GRAPHICS.

The pictures and diagrams on a *monitor* or TV screen, either high or low resolution.

All Commodore home computers have 62 graphic symbols to create low resolution pictures and diagrams, or high resolution modes that allow you to specify each pixel (or dot) on the screen.

(There can be up to 64,000 of these).

GAMES: Commodore produce them all, and more! From shoot 'em up games, to games of adventure and complex strategy.

HELP! On both the Commodore 16 and *Plus/4* computers there is a very special feature: a HELP key. It does exactly what it says: it helps you to debug (which is the smart way of saying, "identify and correct errors") when you're programming.

It highlights errors right down to individual instructions.

HARDWARE.

The computer itself – you can touch it. Whereas software's a program you can only see or hear (on the monitor) when it's running in the computer.

INTEGRAL software is software that is actually built into the computer, as on the Commodore *Plus/4*, the very latest in home computing.

INTRODUCTION to BASIC. Just as you don't need to understand how a car works to be able to drive it, you don't have to understand how a computer works to be able to use one.

But you will definitely get more enjoyment out of it if you do have a basic knowledge of programming.

Which is why "Introduction to BASIC" has become the most popular software tutorial.

It comprises 2 cassettes and an easy-to-follow, step-by-step manual.

INPUT/output: Input is information put into the computer from either the keyboard or a storage device. Output is information from the computer to either a screen, printer or storage device.

JOYSTICK and paddles. As well as improving speed and accuracy, these make games more real by putting the control of whatever it is on the screen directly into your hands.

KILOBYTE is 1,024 bytes. So "K" stands for a unit of 1,024 or 2^{10}. A 64K byte memory unit contains 64 x 2^{10} or 65,536 bytes of memory. And if you don't understand all that, don't worry.

All that's important is knowing you can run more complex programs through a computer with a large memory, than one with a small memory.

LANGUAGE. This is a system of coding that can be understood by a computer. It allows you to "speak" to the computer, and for the computer to "speak" to you. Most home computers speak *BASIC*, but there are also other languages available for Commodore computers that have been designed for specific uses.

For example, LOGO and PILOT in *education*.

MONITOR: this is the screen on which you can see what you've typed into the computer, and also what the computer is saying back to you. You can use an ordinary TV screen, but more preferable is a colour video monitor, like the Commodore 1701.

This is a special device that produces much higher resolution than a TV, and so offers superb reproduction and clarity.

On top of which it allows the rest of the family to stay tuned-in to their favourite TV programme while you're tuned-in to your favourite computer program.

MODEMS allow computers to connect via a telephone line to other computer systems. Commodore 64 modem owners can communicate with other owners, join systems like Prestel/Micronet and an exciting new system called Compunet, where quality software is available cheaply or even free.

MEMORY. There are two basic types of memory: ROM and RAM.

Read Only Memory (ROM) is the computer's permanent built-in memory which tells the computer what to do. It doesn't disappear when the computer's switched off.

Random Access Memory (RAM), however, is for temporary storage. It is the part of the computer's memory that's free for you to use. It can be erased and used over and over again.

It stores both data and instructions during the execution of a computer program. These are lost when you switch the machine off – unless, of course you store them on *cassette* or *diskette*.

NUMBER ONE. In the whole wide world, Commodore is No. 1 in microcomputers, and the Commodore 64 is the No. 1 best seller.

ORIGIN of the computer. In the 19th Century an Englishman, Charles Babbage, invented the first true computer. But his "Analytical Engine," was so ahead of its time, it turned out to be impossible to build!

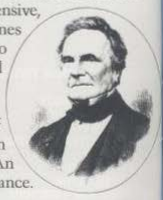
The modern computer first appeared around the time of World War II. Britain's "Colossus" was vast, consumed vast amounts of electricity, required its own air-conditioned room, was unreliable and difficult to operate.

It had its limitations.

Then came the amazing transistor... integrated circuits...and microcomputer.

The first desk top microcomputer in the world was the Commodore PET (this was a friendly name for Personal Electronic Transactor), in 1977.

In effect Commodore had taken hitherto huge, expensive, mysterious machines accessable only to eggheads, reduced the size and price, and put them into the hands of ordinary mortals in ordinary offices. An extraordinary advance.



PERIPHERALS. These are separate add-ons that will extend your computer's capabilities. Like our printers, storage devices and monitor.

PRINTER: One of the ways a computer can "speak" to us.

It means you can produce charts, letters, documents, pictures on paper.

The Commodore range includes four printers and one printer plotter.

The MPS 801 dot matrix printer (so called because its characters are made up of dots) has a print speed of 50 characters per second, about five times as fast as the fastest secretary.

The MPS 802 dot matrix friction feed printer has a print speed of 60 characters per second and uses either single sheets or continuous stationery.

The DPS1101 daisy wheel printer (called that because, surprise, surprise, the print wheel looks a bit like a daisy), produces superb quality print on all letters, reports and documents (the kind of quality one desperately requires on a letter to the bank manager). There's a range of alternative type faces available on additional print wheels. Speed: 18 characters per second.

And the 1520 printer plotter (illustrated). This has 4 colours, and opens up a whole new world of graphic print-out ability. You can draw pictures, create graphic designs, plot graphs or construct bar and pie charts. Speed: 14 characters per second.

QWERTY – the 6 keys at the top left hand side of a standard typewriter. Unlike lesser machines, all Commodore computers have full-size, professional typewriter keyboards.

They have a solid, responsive feel to them. (The problem with rubber or membrane keyboards is they have a soft, spongy feel to them: you press a key, then wonder if the message got through).

RANGE. The range of Commodore software is enormous. There is something, as they say, for everyone: educational, business, home and games.

STARTER PACK. The Commodore 16 Starter Pack has been specially designed to introduce you to computing.

It contains everything you need to start home computing, complete in one box: a 16K computer, *cassette* unit, four superb software programs, and Introduction to *BASIC* Part 1.

It has a *Help* key in case you get into difficulties, and incorporates advanced *BASIC*, which has been specifically designed to simplify the programming process.

Other features include: 4 cursor keys, 2 *joystick* ports, an astonishing 121 colours, plus excellent sound and *graphics* capabilities.

TUNES. Commodore make software to help you compose your very own music.

All our home computers have great sound and music capabilities.

USER friendly. This is a program that explains itself as it goes along, or a computer that people can easily operate.

Every computer manufacturer now claims its products are "user friendly," but only Commodore really demonstrates it. For example, our *Help* key and use of Advanced *BASIC*.

VERTICAL integration is not as complicated as it sounds. All it means is that Commodore make everything to do with computers, from the silicon *chip* to the computer casing.

So we have complete control over everything, from design to manufacture.

It also means, of course, that we can design everything so you're able to get the very best out of your Commodore computer system.

WOMEN also are discovering computers – and not just in offices, but at home. Computers aren't sexist.

They were invented for everyone, and the fact that they're fun, exciting, educational, practical and time-saving are benefits that apply to women just as much as to men.

XMAS. There is no better time to give or receive a Commodore present.

YIPPEE! Yes, now you know (or should do) that computers are really interesting. They're not just about space games with horrendous monsters. Nor are they horrendously complicated machines that you need a maths degree to understand.

Computers are the future, and it's important that you and, even more so, your children don't get left behind in the past.

With a Commodore computer and a *peripheral* or two (and we now know what those are, don't we?) whole new leisure and business opportunities will immediately be opened to you.

Make the choice now and (just so long as it's Commodore) we promise you will never regret it.

ZIP us a line if you'd like more even more biased information on any Commodore products.

Write or telephone: Commodore Information Centre, 1 Hunters Road, Weldon, Corby, Northampton NN17 1QX. Tel: Corby (0536) 205252.

commodore

TWO GREAT NEW CHART CLIMBERS from

COMMODORE 64

WARLOK

Some time in the far future, the Colonial Union is crumbling and the planets Warlok and Aldarr are on the brink of war.

Returning from a mediation conference, an Aldarrian starship is attacked and boarded by the Imperial troops of WARLOK. Four robot drones containing top security information on the Aldarrian planetary defences, are discovered on board the starship and transported to WARLOK where, for interrogation and security purposes, they are each placed at the heart of a heavily fortified underground defence network.

Your mission, as elite space fighter commander of the Aldarrian defence forces, is to enter the network and recover the robot drones before Warlok can discover the drones' access codes.

Before you get to the drones you must survive a lethal defensive network of attack robots, laser barriers oscillating droids and much more . . . Good luck, the fate of Aldarr lies in your hands.

WARLOK is a stunning, high resolution tour-de-force of arcade style fast action. From the first screen as you descend into the defence networks to the final release of the last drone (if you ever make it!) WARLOK is compulsive gaming for all arcade addicts from the hardened old-timers to rank beginners.

COMMODORE 64

HOOPER

From the darkest, mysterious depths of Croatia came Hooper, Prince amongst his own people but ridiculed by humans due to his exaggerated facial features and large floopy hat – a symbol of greatness in his own land. Angered by the taunts of men, Hooper sets off in this cruel world to prove himself any man's equal.

In this, the first of his adventures, Hooper has to enter the infamous death grid where he must steal precious jelly beans from the dreaded Sneakers and Beepers. (The stuff that nightmares are made of). Once the beans are collected he must replace them with fakes then advance to another part of the grid, even more dangerous than before.

To complete his task Hooper must raid each of the eight sections of the death grid six times while nasties get faster and faster. May the strength of your ancestors guide you.

HOOPER is a 100% machine code game written by MAK JURIC

Both programs £7.95 in your high street. If in difficulty contact us direct.

Access and Barclaycard welcome.

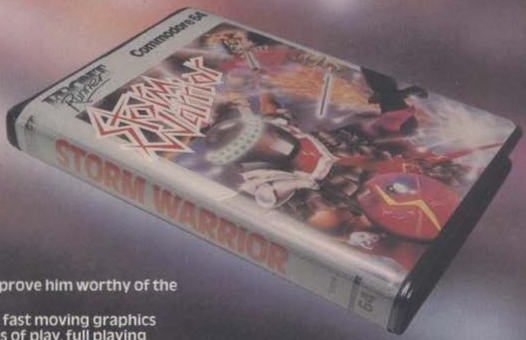
DEALER & DISTRIBUTOR
Enquiries Welcome

119, JOHN BRIGHT STREET, BIRMINGHAM B1 1BE

Telephone: 021-643 5102

Exclusive distributor of SCOTT ADAMS PRODUCTS

Electrifying Action



Storm Warrior.

He needs no allies, his strength and agility will prove him worthy of the name – 'Storm Warrior'.

Storm Warrior is a 12 screen, all machine code, fast moving graphics adventure using 58K of RAM. It features 5 levels of play, full playing demo mode on the first four screens, game freeze facility and a fast loading system.

Commodore 64 Tape £7.95 Disk £9.95 (including VAT.)

The White Viper.

A great graphics adventure in the land of Demons. Coming Soon.

Commodore 64 Tape £7.95 Disk £9.95 (including VAT.)

Dead City Rescue.

The mind blowing, fast loading, 100 screen graphics adventure featuring 5 different speeds of scrolling to give an incredible depth of perspective. Mentally stimulating, strategy packed, visually stunning!

Commodore 64 Tape £7.95 Disk £9.95 (including VAT.)

FRONT Runner

Meet the Challenge

Available from your favourite Software Retailer.

侍ソフトーウェアー

SAMURAI SOFTWARE

Castle of the Skull Lord

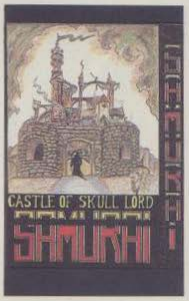
Packaged in a Special Presentation Box which includes a "Free Dust Cover" for your computer.

In a battle lost in the mists of time, the necromantic Skull Lord attacked and defeated a race of noble Dwarves. The Dwarves lost many treasures, the most valuable of these being the "Crown of Dwarves Kings". For many ages did they attempt to regain this artifact, and for many ages did they fail.

Now in desperation they call upon you, noble warrior, to attempt that which is beyond their power.

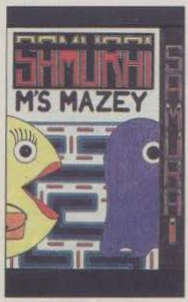
Your quest:— To regain the fabled crown and defeat the all powerful skull lord.

The adventure is of the classic format. Simple verb-noun combinations are expected, and will usually be understood.



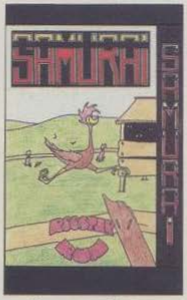
Samurai Invaders

You control a fearsome Samurai warrior whose aim is to prevent the Alien invaders from gaining control of the earth. To help you in this task, you are armed with shuriken, fearsome oriental throwing stars.



Ms. Mazey

Can you guide the intrepid Ms. Mazey around her garden maze and collect the daisies? Or will you fall victim to the evil skull riders? (In a garden?) Can you make it to the magical "flower pills". Will you get the "flower power" to zap the skulls? Will Ms. Mazey ever get to see the flower of her heart, Percy Chucka?



Rooster Run

Why DID the chicken cross the road? You don't know? Neither do we, but with the help of this game you may just find out! Your aim is to guide the hapless rooster across the road, then, get in the boat and avoid the aquamarine hazards. What could be simpler?!

Please tick the correct boxes in the mail order coupon.

£8.95 AMSTRAD ☐	£8.95 SHARP MZ711 ☐
£7.95 CBM 64 ☐	£7.95 DRAGON modified versions ☐
£5.95 SPECTRUM 48K ☐	
£7.95 BBC ☐	£7.95 VIC 20 ☐
£7.95 ELECTRON ☐	£7.95 TI 99/4A ☐

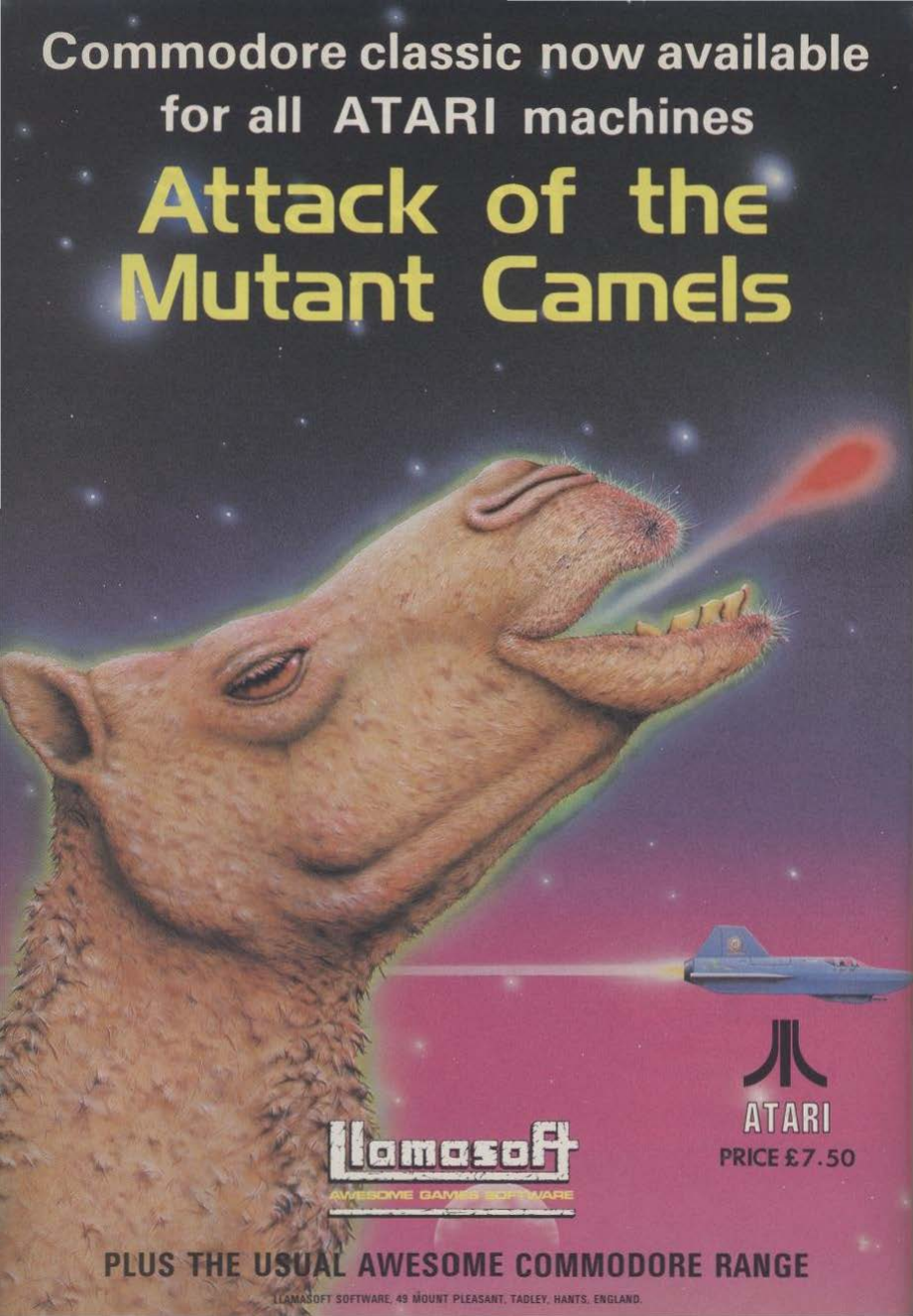
SAMURI INVADERS £7.95 Amstrad only ☐	MS. MAZEY £7.95 Amstrad only ☐	ROOSTER RUN £7.95 Amstrad only ☐

SEND CHEQUES / POSTAL ORDERS TO
Samuri Software
16 Clapgate Lane, Goose Green,
Wigan. WN3 6RN
or Ring: Tele-Sales (0942) 495753 with ACCESS / VISA No. for IMMEDIATE DESPATCH.

Dead City Rescue
The supreme test of mental muscle.
A mind blowing, fast loading, 100 screen graphics adventure featuring 5 different speeds of scrolling to give an incredible depth of perspective. Mentally stimulating, strategy packed, visually stunning.
Commodore 64
Tape £7.95 Disk £9.95
including VAT.
FRONT Runner
Meet the Challenge
Available from your favourite Software Retailer.

Commodore classic now available for all ATARI machines

Attack of the Mutant Camels

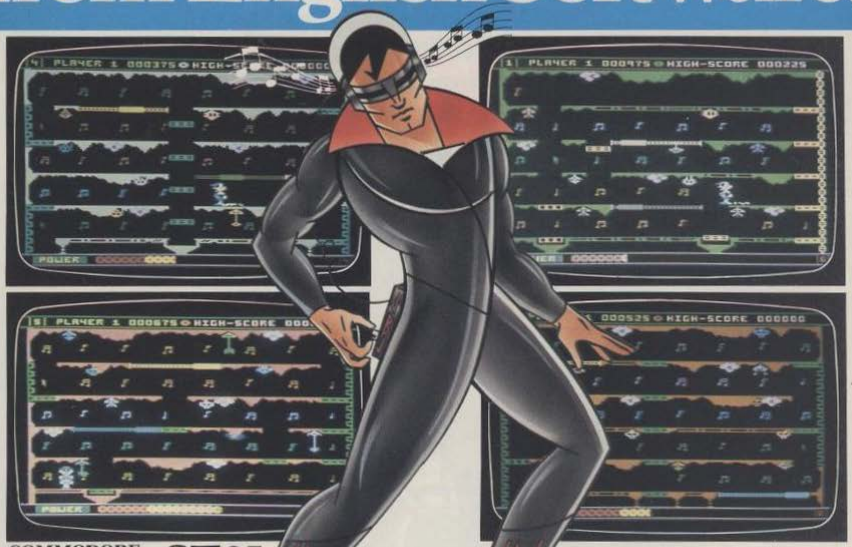


PLUS THE USUAL AWESOME COMMODORE RANGE

LLAMASOFT SOFTWARE, 49 MOUNT PLEASANT, TADLEY, HANTS. ENGLAND.

Tune-in to Jet-Boot Jack. The massive hit from English Software.

NOW AVAILABLE FOR COMMODORE 64



COMMODORE 64 Cassette (Speedload) £7.95

ATARI 32K Cassette or Disk £9.95

Jet-Boot Jack is fast heading for No 1 spot in the Atari games charts.

Because he's absolutely unique.

Jet-Boot Jack is the space-age jet-powered jogger who takes you on a chase through the vaults of the Record Pressing plant, collecting his favourite music as he goes.

Evil creatures try to thwart his every move, but Jack's special bouncing powers send them hurtling to their deaths!

Sliders and elevators provide access to new levels – but sometimes they turn nasty!

With 10 different screens and 6 skill levels Jet-Boot Jack will stretch your abilities to the limit.

Which, after all, is what you've come to expect from English Software.

Jet-Boot Jack and our other programs are available from branches of Laskys, Greens and all good software dealers.

Telephone Sales Hot Line
(Access and Visa) **061-835 1356**

JET-BOOT JACK©

© Copyright 1983 English Software

Program written by Jon Williams and Mark Taylor.

ENGLISH™ SOFTWARE

THE POWER OF EXCITEMENT

The English Software Company, Box 43, Manchester M60 3AD Trade Enquiries Tel: 061-835 1358

(all English Software programs are sold according to the English Software Terms of Trading, copies of which are available on request).

For your COMMODORE 64

Cuthbert Enters the Tombs of Doom

£6.95

Our intrepid hero's BACK. In his latest action packed adventure!

INVENTORY

★ 200 PLUS LOCATIONS in ye High Resolution Graphics
★ My Olde Manual to help ye on thy way
★ "Evyl Ones" whych do inhabit the tombs
★ TREASURES in great abundance
★ MAPS & CLUES so ye don't get too lost.

Another Intrepid Hero
JESSMON HUS

Mail Order Sales from
Microdeal Mail Order 41 Truro Rd,
St. Austell Cornwall PL25 5JE

Credit Card Sales
Phone 0726 73456

Dealers Contact
MICRODEAL DISTRIBUTION
0726-73456
or WEBSTERS SOFTWARE
0483 62222

MICRODEAL

Selected Microdeal Titles available from computer dealers nationwide or from larger branches of

John Menzies Stores and Boots

spectrum

Sensational ZX Spectrum Offer from Spectrum

ZX Spectrum 48K

Including

FREE!

Software 6 pack

Containing: • Computer Scrabble • Computer Chess • Survival game • Chequered Flag game • Horace goes Skiing game • Make-a-Chip

Worth £56.70

SPECTRUM PRICE

£129.95

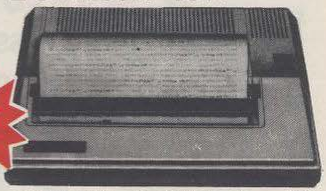
Scoop Purchase!

Timex 2040

Thermal Printer for the SPECTRUM 48K

SPECTRUM PRICE

£77.50



This top-value thermal dot matrix printer is designed especially for use with the Spectrum 48K computer. With a print rate of 80cps on no-ribbon thermal paper and a maintenance-free life, plus 80 dpi graphics capability, the 2040 really is a terrific buy at our low price!

Sinclair QL

32-bit power . 128K RAM . . . business software . . . it's the amazing QL!

ARRIVING SOON!

SPECTRUM PRICE

£399

The Rat

Cheetah Remote Action Transmitter

SPECTRUM PRICE

£29.95

Cheetah's Remote Action Transmitter (R.A.T.) is the most sophisticated computer controller around. Cordless Infra Red transmission lets you sit back (up to 30 feet away) in your chair and enjoy the action! Electronic Touch Control system means no moving parts, superfast action, long life.

DK'Tronics Keyboard

D'Ktronics Lightpen £19.95
D'Ktronics Dualport Joystick Interface £13.00
D'Ktronics Programmable Joystick Interface £22.95

SPECTRUM PRICE

£45

Plus! FREE 4 GAMES CASSETTE

DK Tronics Joystick Interface – Dual Port

The 2 joystick facilities are:
1st port simulates 6789 & 0 keys; the 2nd port simulates in (31) command. It will run any software. 1-Using keys 6789 and 0; 2-Having redefinable key function; 3-Using in (31) fully Kempston compatible; 4-Any software you write yourself

SPECTRUM PRICE

£13

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

Computer Dealers

or prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis please write to Bob Cleaver Spectrum Group PLC, Hunting Gate Hitchin, Herts SG4 0TJ Tel: (0462) 37171

More from Spectrum...

spectrum

NEWS!

WIN!

A fabulous holiday for you and 3 friends in sunny

Florida

Including Disney World Kennedy Space Centre & Florida Keys

WITH SPECTRUM & COMMODORE

★★★★PLUS★★★★

£2,500 spending money

★★★★PLUS★★★★

The 10 Runners-Up each get a £100 Voucher

to spend in any Spectrum store – anywhere in the country.

Just look at the fabulous 1st prize in this new competition – a super holiday for you and 3 friends among the sun, sea and palm trees of Florida, PLUS an incredible £2,500 to spend when you get there.

There's exciting day trips too to the Kennedy Centre, the famous DISNEY WORLD and more!

The competition closes on December 31st 1984 – call into your Spectrum dealer NOW and collect an entry form - you could win the holiday of a lifetime!

MICRO UPDATE

– Spectrum's own magazine for home and small business computers

AUTUMN ISSUE

Have you seen our MICRO UPDATE magazine yet? It's Spectrum's own computer guide, published by the experts for YOU – and the Autumn issue will be out soon.

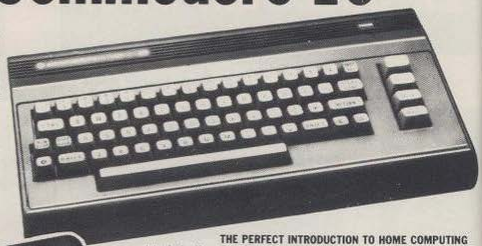
It's packed with illustrations and descriptions of just about everything you're likely to meet in home micro hardware, add-ons and accessories. Plus there's information on current software, and hints and tips from experts about home computing.

Call in to your local Spectrum dealer and get YOUR copy – it's great!

Just Arriving

New! Commodore 16

Including Commodore 1531 Cassette Recorder



THE PERFECT INTRODUCTION TO HOME COMPUTING

Introducing the new Commodore 16 - the advanced micro that's designed with the beginner in mind.

This brand new micro features a powerful 16K RAM, a full professional keyboard, superb graphics with 121 colours, plus terrific built-in sounds.

In its 32K ROM is a new BASIC 3.5 with over 75 commands including graphics plotting and program editing. There's a unique HELP key that highlights errors when you're learning to program.

It's a tremendous new micro and the Spectrum package includes a Commodore Model 1531 Cassette Data Recorder too. See it at your local Spectrum dealer now!

SPECTRUM PRICE ONLY **£139.99**

Add-ons

Simon's Basic	£50.00
Intro to Basic Pt 1	£14.95
Intro to Basic Pt 2	£14.95
MPS801 Printer Ribbon	£9.95
MPS802 Printer Ribbn	£12.95
64 Magic Voice Speech Synthesiser	£50.00

Sensational Value! Commodore 64 Compatible Data Recorder ONLY **£34.99**

Commodore 64 Package Offer

Including:

- Commodore 64
- A Joystick
- C2N Cassette Recorder
- 4 Cassette Games

AND ALL FOR ONLY **£249**

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

See the super new
Commodore Range
at your local Spectrum Dealer - Now!

Just Arriving New!
Commodore Plus/4

Commodore's new, advanced Plus/4 bridges the gap between home and business micros in a way that's unique – and at a price that's unbelievable!

The Plus/4 features, besides its powerful 64K of RAM memory, has a host of features to make computing easier.

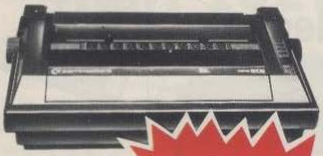
For starters, there are four popular software packages built-in – Word Processing, Spreadsheet, Database and a Business Graphics program. That's all a small businesses needs – in a budget-priced micro!

Besides that, there's a HELP key that highlights errors in program lines, plus built-in graphics, advanced BASIC 3.5 with over 75 commands, separate cursor controls, a full 32K ROM and 4 programmable function keys.

SPECTRUM PRICE

£299.99

New! DPS1101 Printer



SPECTRUM PRICE

£399.99

Commodore 1701 Monitor

£230

Commodore MPS802 Printer

SPECTRUM PRICE

£345.00

MPS801 Printer

SPECTRUM PRICE

£230

1542 Disk Drive

SPECTRUM PRICE

£229

1530 Data Recorder

£44.95

1531 Data Recorder

SPECTRUM PRICE

£44.95

For further information on these products – see Spectrum's own magazine MICRO UPDATE. Ask your local dealer for a copy!

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

Computer Dealers

or prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis please write to Bob Cleaver, Spectrum Group PLC, Hunting Gate, Hitchin, Herts SG4 0TJ Tel: (0462) 37171

More from Spectrum...

spectrum

Micro Dealer UK's TOP 50
Britains No.1 Weekly Software Chart

PROGRAM	SUPPLIER	MACHINE	PRICE
New!Sherlock	Melbourne Hse	Spectrum	£14.95
Daley Thompson	Ocean	Spectrum	£6.90
Decathlon	Activision	CBM 64	£9.99
Daley Thompson	Ocean	CBM 64	£7.90
Astro Chase	State Soft	CBM 64	£8.95
Flip & Flop	State Soft	CBM 64	£8.95
Monty Mole	Gremlin	Spectrum	£6.95
New!Elite	Acornsoft	BBC	£14.95
Death Star Interceptor	System 3	CBM 64	£9.95
New!Zim Sala Bim	Melbourne Hse	CBM 64	£9.95
Full Throttle	Micromega	Spectrum	£6.95
Olympicon	Mitec	Spectrum	£5.95
New!High noon	Ocean	CBM 64	£7.90
Hero	Activision	CBM 64	£9.99
Forest at World's end	Interceptor	Spectrum	£5.50
Bear George	Cheetahsoft	Spectrum	£6 95
Monty Mole 64	Gremlin	CBM 64	£7.95
Lords of Midnight	Beyond	Spectrum	£9.95
Beamrider	Activision	CBM 64	£9.99
New!Stuntbike	Ocean	CBM 64	£6.90
Battle for Midway	PSS	CBM 64	£14.95
Frank N Stein	PSS	Spectrum	£6.95
Pitfall	Activision	CBM 64	£9.99
Tiler	Interceptor	Spectrum	£5.50
Strip Poker	Datasoft	CBM 64	£9.95
Star Striker	Superior	BBC	£7.95
Jet Set Willy	Software Projects	Spectrum	£6.95
New!Pitfall II	Activision	CBM 64	£9.99
Gisburnes Castle	Martech	BBC	£7.95
Sabre Wulf	Ultimate	Spectrum	£9.99
New!River Raid	Activision	Spectrum	£7.99
New!Black Hawk	Creative Sparks	Spectrum	£6.95
New!Havoc	Dynavision	CBM 64	£9.95
New! Enduro	Activision	Spectrum	£7.99
Beachead	Access	CBM 64	£9.95
New!Kokotoni Wilf	Elite	Spectrum	£5.95
Wunda Walter	Interceptor	VIC 20	£6.00
New! Delta Wing	Creative Sparks	Spectrum	£6.95
New!Kokotoni Wilf	Elite	CBM 64	£6.95
New! Zenji	Activision	CBM 64	£9.99
T.L.L.	Vortex	Spectrum	£6.95
New! River Raid	Activision	CBM 64	£9.99
New!Toy Bizarre	Activision	CBM 64	£9.99
New!Jetpac	Ultimate	BBC	£7.95
New!H.E.R.O.	Activision	Spectrum	£7.99
New!Stagecoach	Creative Sparks	Spectrum	£6.95
Giants Revenge	Thor	Spectrum	£6.95
New! Poster Paster	Taskset	CBM 64	£6.90
Stop the Press	Sinclair	Spectrum	£5.95
Matchpoint	Psion	Spectrum	£7.95

Amstrad Software all at £8.95

EDUCATIONAL SOFTWARE	Time Man 2	Roland on the Ropes	3-D Invaders
Wordhang	Map Rally	Electron 22622	Alien Invasion
Happy Numbers	ARCADE GAMES	Gems of Stradus	Atom smasher
World Wise	Home Runner	Chess	Electro Freddy
Animal, Vegetable, Mineral	Harrier Attack	Laser Wrap	Fire Blaster
Happy Letters	Sultans Maze	Haunted Hedges	Admiral Graf Spee
Happy Writing	Spanner Man	Codename Matt	Star Commands
Time Man 1	Oh Mummy	Xanagrams	Crazy Golf
	Roland in Care	Hunter Killer	Punchy

BBC Model B
Package Offer

HURRY! Offer extended WHILE STOCKS LAST

Including FREE!

• Cassette recorder • 5 pieces of software

when you purchase a BBC 'B' from Spectrum.

The BBC MODEL B, probably the most flexible personal microcomputer available today. Using powerful BBC BASIC, the BBC B is widely accepted as providing the educational standard for computer learning.

The model B features a variety of interface ports allowing easy connection not just of ordinary peripherals but also second processors or devices to give access to teletext or prestel services.

£399

Cumana Disc Drives

CSX 100 £129.95
CS 100 £159.99

Acorn Electron

The Electron gives high quality graphics output to either colour TV or monitor. Sound can be generated through the internal loudspeaker. The Electron comes complete with a free introductory cassette, containing 19 free programmes & two manuals - the User Guide and Start programming with the Electron.

SPECTRUM PRICE **£199.95**

Super Value-For-Money Shado Data Recorder

Compatible with ACORN BBC and ELECTRON micros

SPECTRUM PRICE **£32.95**

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

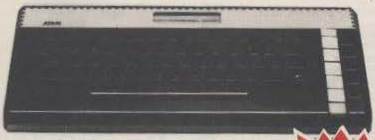
Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

Atari

A great line up from one of the first names in home computing...
...Now at Super New Low prices from Spectrum

Atari 800XL



• Powerful 64K RAM • Full-stroke keyboard • Full sound with 3½ octave range • 11 Graphic Display modes • Full colour (256 Colours - 128 colours can be diplayed at one time) Ask to see this super new micro at your local SPECTRUM dealer NOW!

SPECTRUM PRICE **£199.99**

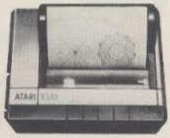
Atari 600XL

The 600XL features a 16K RAM, expandable to 64K with the memory expansion module. There's a 24K ROM operating system including ATARI BASIC. Plus 16 colours, 11 graphic modes and 4 independent 3½-octave sound synthesisers. It really is a top-value micro - come in and see for yourself!

SPECTRUM PRICE **£99.99**

Atari 1020 Printer/Plotter

Using 4 colour graphics and text, the 1020 colour printer/plotter is perfect for creating charts, graphs & even artistic designs. Very quiet operation.



SPECTRUM PRICE **£99.99**

Atari 850 Interface

Essential for more advanced work with their Atari computers. It provides 1 parallel output for a huge range of printers, and no less than 4 serial outputs which can be individually programmed for different purposes. It comes with a comprehensive manual, power pack & interconnecting cable to the computer.

SPECTRUM PRICE **£99.99**

Atari 1010 Program Recorder

Add storage and retrieval capability to your Computer system without spending a lot of money. Uses cassettes to store text, programs & other information.

SPECTRUM PRICE **£34.99**

Atari 1050 Disk Drive

Add the Atari 1050 Disk Drive for fast, convenient data access by storing on compact, easy-to-handle 5¼" disks. Storage capacity with DOS 11 up to 127K bytes, (around 100 pages) of information per disk.

SPECTRUM PRICE **£199.99**

Atari 1027 Letter Quality Printer

This superb Letter Quality Printer prints fully-formed letters just like a quality electric typewriter, making it the ideal word-processing companion for business correspondence. The Atari 1027 accepts single sheets of paper so you can even use your own letterhead paper.

SPECTRUM PRICE **£249.99**

Atari Software

Entertainment		Tennis	£9.99	(Cassette)	£22.99
Asteroids	£9.99	Defender	£14.99	Invitation to Prog 3	
Basketball	£9.99	Dig Dug	£14.99	(Cassette)	£24.99
Caverns of Mars	£9.99	Donkey Kong	£14.99	Juggles Rainbow (Disk or	
Centipede	£9.99	Donkey Kong JR.	£14.99	Cassette)	£19.99
Chess	£9.99	Joust	£14.99	Juggles House (Disk or	
Galaxian	£9.99	Ms pac Man	£14.99	Cassette)	£19.99
Jungle Hunt	£9.99	Pole Position	£14.99	Touch Typing	£12.99
Pac Man	£9.99	Robotron	£14.99	Conversational	French
Lone Raider	£9.99	Logo & Manuals	£99.99	(Cassette)	£22.99
Missile Command	£9.99	Video Easel	£22.99	Conversational	German
Pengo	£9.99	Music Composer	£22.99	(Cassette)	£22.99
Qix	£9.99	Assembler Editor	£22.99	Conversational	Spanish
Space Invaders	£9.99	Invitation to Prog 1		(Cassette)	£22.99
Star Raiders	£9.99	(Cassette)	£19.99	Conversational	Italian
Super Breakout	£9.99	Invitation to Prog 2		(Cassette)	£22.99

Macro Assembler (Disk) £19.99
Micro Soft Basic & Manuals (Disk) £49.99
Mickey & the Great Outdoors (Disk) £24.99
My First Alphabet (Disk) £19.99
Paint (Disk) £29.99
Microsoft Basic II & Manuals £49.99
Home Business
Atari Writer £39.99
Visicalc (Disk) £49.99
Timewise (Disk) £19.99
And many more.

Spectrum Computer Centres have no connection whatsoever with the ZX Spectrum Computer manufactured by Sinclair Research Ltd.

Computer Dealers

or prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis please write to: Bob Cleaver, Spectrum Group PLC, Hunting Gate, Hitchin, Herts SG4 0TJ Tel: (0462) 37171

More from Spectrum...

spectrum

Sensational Printer Offers from Spectrum

Juki 6100

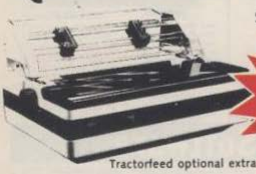
Super Value! **Daisy Wheel Printer**

This fabulous new printer is a real breakthrough in the performance/value stakes! For a remarkably low price you get all these great features:
● Daisywheel printing ● 20cps (av. 18cps Shannon Text) ● 10/12/15 or Proportional character spacing ● Bi-directional friction-feed ● Tractor feed or cut paper ● Centronics as standard; RS232C optional ● 2K byte print buffer

SPECTRUM PRICE **£399**

Quendata

Just look at this for value - a true daisy-wheel printer offering top quality printing at a remarkably low price. Print speed is 18/20cps, uni-or bi-directional printing (depends on software), variable pitch.



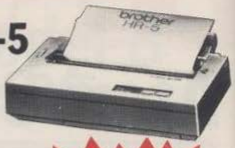
SPECTRUM PRICE **£289.95**

Tractorfeed optional extra

Other Printer Bargains

SEIKOSHA	
GP50A	£99.95
GP50S Spectrum	£99.95
GP500A	£179.95
GP550A	£229.00
GP100A MkII	£199.95
GP100VC VIC 20/64	£199.95
Friction Feed GP100/250X	£28.75
EPSON	
FX80	£503.70
RX80T	£286.35
RX80FT	£327.75

Brother HR-5



Super value printer that prints on plain paper, yet still fits in your briefcase.
● Operates on 4 standard batteries
● Incorporates Centronics or RS232C
● Bidirectional or unidirectional
● High quality Thermal head
● Prints at 30cps on plain paper (with ribbon) or directly onto thermal paper
● Weighs under 2kg

SPECTRUM PRICE **£159.95**

Brother HR-15

A great printer at a top-value price from Spectrum. Here's what you get:
● Letter-quality daisy-wheel printing
● Between 13 and 18cps
● Bi-directional printing
● Tractor-fed paper or single sheets
● Super low price!

SPECTRUM PRICE **£458.85**

Brother EP-44

"Transforming Office Machines", runs Brother's slogan – with these super-compact battery powered typewriters, it's easy to see why!
● Top quality thermal printing head
● 4K of text memory (3 A4 pages)
● Text centring if required
● 15-digit LCD display for pre-printing corrections
● Line-by-line edit facility

SPECTRUM PRICE **£249.95**

Smith-Corona D100

This superb dot matrix printer from Smith-Corona is a sleek, well-made machine that'll work with either tractor- or friction-fed paper. It offers a fast 120cps print speed, with 80 characters per line and a choice of well-defined typestyles. The D-100 incorporates a Centronics parallel interface.

Also available
Fastex 80
£225.17

SPECTRUM PRICE **£286.35**

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

● There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

There's a Spectrum near you....

AVON

BATH Software Plus, 12 York St Tel: (0225) 61676
WESTON-S-MARE K & K Computers, 32 Alfred St Tel (0934)419324

BEDFORDSHIRE

DUNSTABLE Dormans 7-11 Broad Walk Tel: (0582) 65515
LEIGHTON BUZZARD The Computer Ctr at Milton Keynes Music, 17 Bridge St. Tel: (0525)376622
LUTON Terry-More, 49 George St. Tel: (0582) 23391/2

BERKSHIRE

BRACKNELL Computer Centre, 44 The Broadway. Tel: (0344) 427317
SLOUGH MU Games and Computers 245 High St. Tel: (0753) 21594

BUCKINGHAMSHIRE

BLETCHLEY Rams Computer Centre, 117 Queensway. Tel: (0908) 647744
CHESHAM Reed Photography & Computers, 113 High St. Tel: (0494) 783373

CAMBRIDGESHIRE

CAMBRIDGE K P Computers Ltd. 19/20 Market St. Tel: (0223) 312240 (Open 6 Days)
HUNTINGDON T.S.C. Electronics, 3 All Saints Passage, High St. Tel: (0480) 411579
PETERBOROUGH Pitrbrgh Communications, 91 Midland Rd. (0733) 41007

CHANNEL ISLANDS

GUERNSEY Gruts, 3-5 The Pollett, St Peter Port. Tel: (0481) 24682
JERSEY Audio & Computer Centre, 7 Peter St, St Helier. Tel: (0534) 74000

CHESHIRE

ALTRINCHAM Mr Micro 28 High St. Tel: (061) 941 6213
CREWE Microman Unit 2, 128 Nantwich Rd. Tel: (0270) 216014
ELLESMERE PORT RFR Computers, 1 Pooltown Rd. Whitby. Tel: 051 356 4150
MACCLESFIELD Camera & Computer Centre 118 Mill St. Tel: (0625) 27468
STOCKPORT Wilding Ltd. 1 Little Underbank Tel: (061) 480 3435
WARRINGTON Wildings, 111 Bridge St. Tel: (0925) 38240
WIDNES Computer City, 78 Victoria Road. Tel: (051) 420 3333
WILMSLOW Swift of Wilmslow, 4-6 St. Anoes Parade. Tel: (0625) 526213

CLEVELAND

MIDDLESBOROUGH McKenna & Brown, 206 Linthorpe Rd. Tel: (0642) 222368

CORNWALL

ST AUSTELL A B & C Computers, Duchy House, 6 Lower Aylmer Sq. Tel: (0726) 67337
TRURO Truro Micro Ltd. Unit 1, Bridge Ho., New Bridge St. Tel: (0872) 40043

CUMBRIA

BARROW-IN-FURNESS Barrow Computer Centre, 2/4 The Mall. Tel: (0229) 38353
CARLISLE The Computer Shop, 36-38 Lowther St. Tel: (0228) 27710
PENRITH Penrith Communications, 14 Castlegate. Tel: (0768) 67146 Open Mon-Fri till 8pm
WHITEHAVEN P D Hendern 15 King St. Tel: (0946) 2063

DERBYSHIRE

ALFRETON Gordon Harwood 69-71 High St. Tel: (0773) 832078
CHESTERFIELD The Computer Centre, 14 Stephenson Place Tel: (0246) 208802

DEVON

EXETER Seven Counties (Computers) Ltd., 7 Paris Street. Tel: (0392) 211211
EXMOUTH Open Channel, 30 The Strand. Tel: (0395) 264408
PLYMOUTH Syntax Ltd., 76 Cornwall St. Tel: (0752) 28705
TIVERTON Actron Micro Computers, 37 Bampton St. Tel: (0884) 252854
TORQUAY Devon Computers, 8 Torhill Rd., Castle Circus. Tel: (0803) 526303

DORSET

BOURNEMOUTH Lansdowne Computer Ctr 1 Lansdowne Crescent. Tel: (0202) 20165

DURHAM

DARLINGTON McKenna & Brown, 102 Bondgate. Tel: (0325) 459744

ESSEX

BASILDON Godfrey's 28-32 East Walk. Tel: (0268) 289379
BASILDON Godfrey's Computer Centre, 5 Laindon Main Centre Laindon. Tel: (0268) 416747
CHELMSFORD Maxton Hayman Ltd., 5 Broomfield Rd. Tel: (0245) 354595
COLCHESTER Brainwave 51 Head St. Tel: (0206) 561513
GRAYS H Reynolds, 79 Orsett Rd. Tel: (0375) 5948
ILFORD Woolfmans, 76 Ilford Lane. Tel: (01) 478 1307
SOUTHEND Computer Centre 332 London Rd. Tel: (0702) 337161

HAMPSHIRE

BASINGSTOKE Fisher's, 2-3 Market Place. Tel: (0256) 22079
PORTSMOUTH (Waterlooville) G B Microland, London Rd., (Opp. Co-op) Tel: (07075) 259911.
SOUTHAMPTON L.T.C. Ltd., 112 East St., Tel: (0703) 333958/24703
WINCHESTER Winchester Camera & Computer Centre 75 Parchment St. Tel: (0962) 53982

HEREFORD

HEREFORD Melgray Hi-Tech Ltd., 49 Broad St. Tel: (0432) 275737

HERTFORDSHIRE

HITCHIN GK Photographic & Computers, 68A Hermitage Rd., Tel: (0462) 59285
POTTERS BAR The Computer Shop, 197 High St. Tel: (0707) 44417.
ST ALBANS (Herts) Clarks Computer Centre 14-16 Hollywell Hill. Tel: (0727) 52991
STEVENAGE D J Computers, 11 Town Square. Tel: (0438) 65501
WATFORD SRS Microsystems Ltd, 94 The Parade, High St. Tel: (0923) 26602
WELWYN GARDEN CITY D J Computers, 40 Fretherne Rd., Tel (07073) 28435/28444

HUMBERSIDE

BEVERLEY Computing World, 10 Swaby's Yard Dyer Lane. Tel: (0482 881831
GRIMSBY RC Johnson Ltd., 72 Freeman, Riverhead Centre. Tel: (0472) 42031
HULL The Computer Centre, 26 Anlaby Rd. Tel: (0482) 26297

ISLE OF MAN

DOUGLAS T H Colebourn Ltd., 57-61 Victoria St. Tel: (0624) 3482

ISLE OF WIGHT

COWES Beken & Son, 15 Bath Rd. Tel: (0983) 297181

KENT

BECKENHAM Supa Computers Ltd, 425 Croydon Rd. Tel: (01) 650 3569
BROADSTAIRS Video Vision 19/20 Willow Court, St Peters Park Road Tel (0843) 63284 (No Early Closing Day)
BROMLEY Computers Today 31 Market Square Tel: (01) 290 5652
CANTERBURY Cibury Computer Centre 56/57 Palace St. Tel: (0227) 62101
DOVER Kent Photos & Computers, 4 King St. Tel: (0304) 202489
GRAVESEND Marshalls Computers & Cameras, 3 Windmill St. Tel: (0474) 65930
RAINHAM Microway Computers Ltd., 39 High St. Medway Towns. Tel: (0634) 376702
SEVENOAKS Ernest Fielder Computers, Dorset St. Tel: (0732) 456800
SITTINGBOURNE Computers Plus, 65 High St. Tel: (0795) 25677
TUNBRIDGE WELLS Modata Computers Ltd. 28-30 St Johns Rd. Tel: (0892) 41555

LANCASHIRE

ACCRINGTON PV Computers, 104 Abbey St. Tel: (0254) 36521/32611
BLACKBURN Tempe Computers, 9 Railway Rd. Tel: (0254) 691333
BURNLEY IMO Computer Centre, 39/43 Standish St BB11 1AP Tel: (0282) 54299
PRESTON Wilding's, 49 Fishergate. Tel: (0772) 556250

LEICESTERSHIRE

MARKET HARBOROUGH Harborough Home Computers, 7 Church St. Tel: (0858) 63056

LONDON

E6 Percivals, 85 High St. North, East Ham. Tel: (01) 472 8941
E17 Erol Computers Ltd., 125 High Street Walthamstow Tel: (01) 520 7763
EC1 Pedro Computer Services Ltd. 47 Clerkenwell Road Tel: (01) 251 8635
EC2 Devron Computer Centre, 155 Moorgate Tel: (01) 638 3339/1830
N14 Logic Sales, 19 Broadway, The Bourne, Southgate. Tel: (01) 882 4942
N20 Castlehurst Ltd. 1291 High Rd. Tel: (01) 446 2280
NW4 Da Vinci Computer Store, 112 Brent St. Hendon Tel: (01) 202 2272
NW11 Computers inc. 86 Golders Green Rd Tel: (01) 209 0401/0279
SE1 Vic Odden's 6 London Bridge Walk. Tel: (01) 403 1988
SE9 Square-Deal, 373-375 Footscray Rd., New Eltham. Tel: (01) 859 1516
SE15 Castlehurst Ltd., 152 Rye Lane, Peckham. Tel: (01) 639 2205
SW16 Buffer Micro Shop, 310 Streatham High Rd. Tel: (01) 769 2887
W1 Computers of Wigmore St., 87 Wigmore St. Tel: (01) 486 0373
W1 Sonic Foto & Micro Centre, 256 Tottenham Court Rd. Tel: (01) 580 5826
W1 Ramsons 4 Edgware Rd. Tel: (01) 724 2373

GREATER MANCHESTER

BOLTON Wilding Ltd., 23 Deansgate Tel: (0204) 33512
MANCHESTER Lomax Ltd., 8 Exchange St. St. Ann's Square. Tel: (061) 832 6167
OLDHAM Home & Business Computers Ltd., 54 Yorkshire St. Tel: (061) 6331608
ROCHDALE Home & Business Computers, 75 Yorkshire St. Tel: (0706) 344654
SWINTON Mr Micro Ltd., 69 Partington Lane. Tel: (061) 728 2282 Late Night Friday
WIGAN Wilding Ltd., 11 Mesnes St. Tel: (0942) 44382

MERSEYSIDE

BIRKENHEAD Fairs Cameras & Hi-Fi, Dacre Hill, Rock Ferry. Tel: (051) 645 5000
BIRKENHEAD Thorngueard Computer Systems, 46 Pensby Rd. Tel: (051) 342 7516
HUYTON Ian Houghton 5 Huyton Hey Rd. Tel: (051) 489 5785
LIVERPOOL Beaver Radio, 20-22 Whitechapel. Tel: (051) 709 9898
LIVERPOOL (Aintree) Hargreaves, 31-37 Warbreck Moor. Tel: (051) 525 1782

MIDDLESEX

HARROW Camera Arts, (Micro Computer Division) 42 St Ann's Rd Tel: (01) 427 5469
TEDDINGTON Andrews, Broad St. Tel: (01) 977 4716
UXBRIDGE J K L Computers, 7 Windsor St. Tel: (0895) 51815

NORFOLK

FAKENHAM Fastview, 12 Norwich Rd. Tel: (0328) 51319
KING'S LYNN Computer Plus, 40 Conduit St. Tel: (0553) 4550
NORWICH Norwich Camera Centre 20 White Lion Str. Tel: (0603) 612537
NORWICH Brainwave 11A Castle Meadow Tel: (0603) 663796
THETFORD C B & Micros, 21 Guildhall St. Tel: (0842) 61645

NORTHAMPTONSHIRE

NORTHAMPTON Dormans, 22 Princes Walk Grosvenor Centre. Tel: (0604) 37031

NOTTINGHAMSHIRE

NOTTINGHAM Jacobis Computers, 13 Middlegate Newark. Tel: (0636) 72594
WORKSOP Computagrafix, 132 Bridge St. Tel: (0909) 472248

NORTHERN IRELAND

BELFAST Arthur Hobson Ltd., 37 Great Victoria St. Tel: (0232) 246336
PORTSGOWN Pedlows, 16 Market St., Craigavon County Armagh. Tel: (0762) 332265
LONDONDERRY Foyle Computer Systems, 3 Bishop St. Tel: (0504) 268337
NEWRY Newry Computer Centre, 34 Monaghan St. Tel: (0693) 66545

NORTHUMBERLAND

MORPETH Telerents 31 Newgate St. Tel: (0665) 513 537

OXFORDSHIRE

ABINGDON Ivor Fields Computers, 21 Stert St. Tel: (0235) 21207
BANBURY Computer Plus, 2 Church Lane. Tel: (0295) 55890
OXFORD Ivor Fields, 7 St Ebbes St. Tel: (0865) 247082

SCOTLAND

ABERDEEN North East Computers, 1-3 Ellis St., Peterhead. Tel: (0779) 79900
AYR Vennals, 6A New Bridge St. Tel: (0292) 264124
DUMFRIES Vennals, 71 English St. Tel: (0387) 54547
EDINBURGH The Silicon Centre, 6-7 Antigua St. Tel: (031) 557 4546
GLASGOW Victor Morris Ltd., 340 Argyle St. Tel: (041) 221 8958
HAMILTON Tom Dickson Computers, 8-12 Cadzow St. Tel: (0698) 283193

SHROPSHIRE

SHREWSBURY Computerama, 13 Castlegate. Tel: (0743) 60528
TELFORD Computer Village, 4 Hazeldine House Telford Town Centre. Tel: (0952) 506771

SOMERSET

TAUNTON Grays, 1 St James St. Tel: (0823) 72986

STAFFORDSHIRE

STAFFORD Computerama, 59 Forgate St. Tel: (0785) 41899
STOKE-ON-TRENT Computerama, 11 Mkt Square Arcade Hanley. (0782) 268620
STOKE-ON-TRENT The Microchip, 37 Station Rd. Biddulph Tel: (0782) 511559

SUFFOLK

BURY ST EDMUNDS Guildhall Cptr Ctr, 11 Guildhall St. Tel: (0284) 705772
IPSWICH Brainwave, 24 Crown St. Tel: (0473) 50965
LOWESTOFT John Wells, 44 London Rd North Tel: (0502 3742

SURREY

CAMBERLEY Camera Arts (Micro Computer Division), 36 High St. Tel: (0276) 65848
CATERHAM Telecare, 35-37 Croydon Rd, Tel: (0883) 6269
CHERTSEY Chertsey Computer Centre, 1 Windsor St. Tel: (09328) 64663
EPSOM The Micro Workshop, 12 Station Approach Tel: (03727) 21533
HASLEMERE Haslemere Computers, 25 Junction Pl. (Adj. Rex Cinema) Tel: (0428) 54428
RICHMOND Crest Computer Services, 8 Hill St. Tel: (01) 940 8635
WALLINGTON Surrey Micro Systems Ltd., 53 Woodcote Rd. Tel: (01) 647 5636
WOKING Harpers, 71-73 Commercial Way. Tel: (04862) 25657

SUSSEX

BEXHILL-ON-SEA Computerware, 22 St Leonards Rd. Tel: (0424) 223340
BOGNOR REGIS Bits & Bytes High Str., Tel: (0243) 867143
BURGESS HILL Weald Computers, 247-249 London Rd. Tel: (04446) 41281
CRAWLEY Gatwick Computer Services, 62 Boulevard. Tel: (0293) 37842
LITTLEHAMPTON Alan Chase Ltd., 39 High St. Tel: (09064) 5674

WALES

ABERDARE Inkey Computer Services Ltd., 70 Mill St. The Square Trecynon. Tel: (0685) 881828
ABERYSTWYTH AberData at Galloways, 23 Pier St. Tel: (0970) 615522
CARDIFF Randall Cox, 18-22 High St Arcade. Tel: (0222) 31960
LLANDUDNO (Gwynedd) Computer Plus Discount, 15 Clonmel St. Tel: (0492) 79943
NEWPORT (Gwent) Randall Cox, 118 Commercial St. Tel: (0633) 67378
PEMBROKE Randall Cox, 19 Main St. Tel: (0646) 682676
WREXHAM T E Roberts, 26 King St. Tel: (0978) 364404/364527

WARWICKSHIRE

NUNEATON Micro City 1A Queens Road Tel: (0203) 382049
RUGBY The Rugby Micro Centre, 9-11 Regent St. Tel: (0788) 70522

WEST MIDLANDS

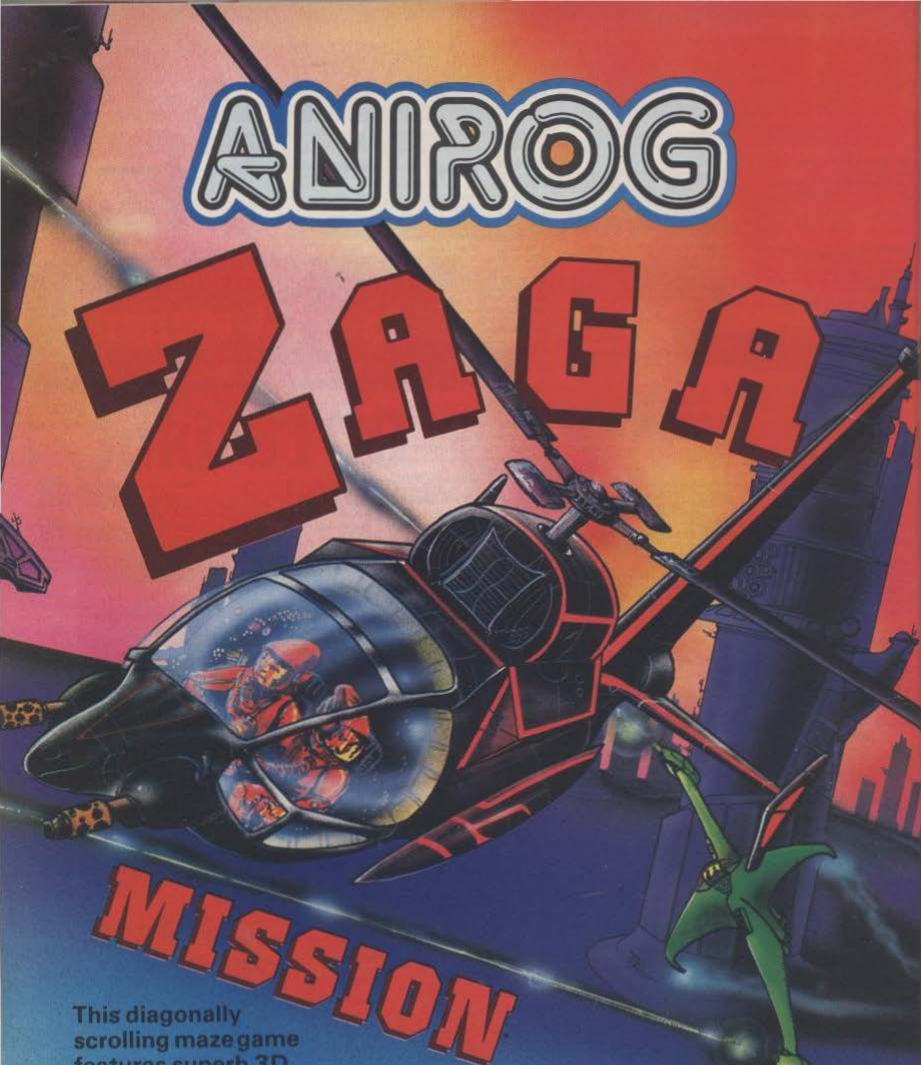
COVENTRY Greens, 22 Market Way. Tel: (0203) 28342
DUDLEY Central Computers, 35 Church Hill Precinct. Tel: (0384) 238589
WALSALL New Horizon Computer Centres, 1 Goodall St. Tel: (0922) 24821
WEST BROMWICH Bell & Jones, 39 Queens Square. Tel: (021) 553 0820

WORCESTER

KIDDERMINSTER Central Computers, 20-21 Blackwell St. Tel: (0562) 746941
WORCESTER David Waring Ltd., 1 Marmion House High St. Tel: (0905) 27551

YORKSHIRE

BRADFORD Erricks, Fotosonic House Rawson Square. Tel: (0274) 309266
DEWSBURY Home & Business Computers, 59 Daisy Hill. Tel: (0924) 455300
DONCASTER The Soft Centre 8 Queensgate Waterdale Centre Tel (0302) 20088
HUDDERSFIELD Richards (Formerly Laurens) 12 Queen St. Tel: (0484) 25334
HULL Computer Centre 26 Anlaby Rd. Tel: (0482) 26297
LEEDS Bass & Bligh, 4 Lower Briggate. Tel: (0532) 454451
YORK York Computer Centre 7 Stonegate Arcade. Tel: (0904) 641862



This diagonally scrolling maze game features superb 3D graphics brilliant sound effects and requires 100% concentration to successfully manoeuvre your helicopter through unknown hazards in order to complete Zaga Mission and live to play another day — Commodore 64 — £7.95

Also available on Disk at £9.95

TRADE ENQUIRIES: ANIROG SOFTWARE LTD. 29 WEST HILL DARTFORD KENT (0322) 92513/8
MAIL ORDER: 8 HIGH STREET HORLEY SURREY 24 HOUR CREDIT CARD SALES HORLEY (02934) 6083
PAYMENT BY CHEQUE P.O. ACCESS/VISA 50p POSTAGE & PACKAGING

COMPUTER LINK

CONNECTORS IDC

	Card Edge	(Transition) PCB	2 Row Socket
10-way	£1.20	£0.85	£0.80
14-way			£0.90
16-way	£1.60	£1.20	£1.00
20-way	£1.90	£1.35	£1.20
26-way	£2.40	£1.80	£1.45
34-way	£3.10	£1.95	£1.60
40-way	£3.40	£2.00	£1.85
50-way	£3.85	£2.25	£2.00
60-way	£4.80	£2.60	£2.25

IDC SHROUDED HEADERS WITH EJECTING LOCKING ARMS

	Straight	Right Angle
10-way	.85	.90
14-way	£1.00	£1.20
16-way	£1.25	£1.45
20-way	£1.40	£1.60
26-way	£1.70	£1.95
34-way	£2.00	£2.30
40-way	£2.15	£2.45
50-way	£2.30	£2.65
60-way	£2.45	£2.85

IDC D CONNECTORS

	Male	Female
9-way	£2.70	£3.20
15-way	£3.20	£3.70
25-way	£3.90	£4.45
37-way	£5.90	£6.80

IDC AMPHENOL (Centronics)

36-way plug	£4.95
36-way socket	£5.95

PRINTER LEADS

ALL 1 METRE LENGTH

BBC	£9.95
BBC serial	£8.95
AMSTRAD	£16.75
MEMOTECH	£12.75
EINSTEIN	£12.75
IBM PCC	£15.95
SPECTRUM interface 1 to RS 232	£9.75
SPECTRUM interface 1 to Centronics	£10.75
CENTRONICS to Centronics	£15.20
DRAGON	£9.95

COMPUTER LEADS

Dual disk drive 1m	£10.25
Single disk drive 1m	£7.25
7 pin DIN plug to 2x3.5mm 1x2.5m Jack plugs	£2.25
5 Pin DIN plug to 2x3.5mm 1x2.5mm Jack plugs	£2.20
6 Pin DIN Plug to 6 Pin DIN Plug	£1.95
2x3.5mm Jack plugs to 2x3.5mm Jack plugs to 1x2.5mm Jack plug	£1.25
7 Pin DIN plug to 5 pin DIN plug	£1.95
7 Pin DIN Plug to 3 pin DIN plug and 2.5mm Jack plug	£2.25
7 Pin DIN plug to 7 Pin DIN plug	£2.25
5 Pin Domino Plug to 5 pin Domino plug	£1.95
Phono Plug to Coaxial TV Aerial plug	95p

D CONNECTORS

	Solder Bucket	Male	Female
9-way	.75	£1.00	
15-way	.95	£1.50	
25-way	£1.50	£1.90	
37-way	£2.40	£3.25	
HOODS	.95		

DIP HEADERS

Pins	
14	90p
16	£1.00
24	£1.40
28	£3.95
40	£2.15

RIBBON CABLE (Price per ft)

	Grey	Rainbow
9-way	.13	.24
10-way	.15	.28
14-way	.18	.32
15-way	.20	.36
16-way	.22	.40
20-way	.30	.50
24-way	.36	.60
25-way	.40	.65
26-way	.45	.70
34-way	.60	.80
37-way	.65	.85
50-way	.70	.90
50-way	.95	£1.25
60-way	£1.10	£1.40
64-way	£1.15	£1.50

TELEPHONE CONNS

Surface master jack socket	£3.75
Surface extn socket	£2.50
Dual outlet adaptor	£4.25
Line jack cord 3mtr	£1.85
BT jack plug	48p
4 core cable per metre	15p

All surface units shuttered BT approved.

EDGE CONNECTORS

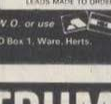
2x23-way (ZX81)	£1.85
2x28-way (Spectrum)	£2.10
2x6-way VIC20/64	£1.20
2x12-way	£1.60

DOUBLE SIDED PLUG BOARDS

ZX81 23-way	£1.25
Spectrum 28-way	£1.50

MONITOR LEADS

BBC 6-pin to start plug	£4.95
BNC plug to phono plug	£2.95
QL to colour monitor	£1.75
QL to mono monitor	£1.25



BBC JOYSTICK DELUXE JOYSTICK for BBC MICRO. Fits directly into BBC Micro analogue port

£12.95

SPECTRUM EXTENSION LEADS

6 inch extension cable M to F	£10.50
6 inch M to 2 F's	£14.75
12 inch extension cable M to F	£10.75

Other conviguations made to order
Write or phone for quote

CUSTOM ASSEMBLIES

ANY COMBINATION OF IDC & RIBBON CABLE LEADS MADE TO ORDER

SEND SAE FOR *FREE* CATALOGUE

Please add 15% VAT

Free p&p C.W.O. or use

COMPUTER LINK Dept. YC 11, PO Box 1, Ware, Herts.
Telephone: 0920 5286

HIRE SPECTRUM SOFTWARE

OVER 280 different tapes for hire including **ARCADE, ADVENTURE, BUSINESS, EDUCATIONAL**, etc. –even an m/c Compiler. **FREE** 26 page catalogue. **FREE** newsletter, with hints, tips and our top tape chart.

OVER 3000 tapes in stock, with up to 60 copies of each title for fast service. All tapes sent by 1st class post.

LOWEST PRICES – hire up to 3 tapes at a time, from 63p each for two weeks hire. (Plus p&p and VAT). European members welcome.

Tapes for sale at DISCOUNT prices. Telephone 01-661 9240 (9am - 5pm) or write for further details, or complete the coupon and **JOIN TODAY** – you've nothing to lose!

SAVE £3.00!!

For a limited period, we are offering **HALF-PRICE** membership to readers of this magazine. Join now, **LIFE** membership is only £3.00 (normally £6.00).

SWOP SHOP

A new service from N.S.L. **SWOP** your unwanted tapes with tapes from other members for a small handling charge of only 60p (plus p&p and VAT)

NATIONAL SOFTWARE LIBRARY

42 Harefield Avenue, Cheam, Surrey SM2 7NE.

I enclose cheque/postal order for £3.00 for LIFE membership. Please rush my membership kit to me. If, within 28 days, I'm not delighted with your service you'll refund my membership fee..

Name .....

Address .....

..... YC10

star ATTRACTIONS

£189.95
+VAT = £218.44

120 CPS ● BI-DIRECTIONAL LOGIC SEEKING ● FRICTION TRACTOR AND ROLL HOLDER STANDARD ● DOWNLOADABLE CHARACTERS ● ULTRA HIGH RESOLUTION ● 80 COLS ● IBM PC VERSION NOW AVAILABLE

GEMINI-10X

FIDELITY

12 MHZ VIDEO BANDWIDTH
RGB AND COMPOSITE VIDEO
MEDIUM RESOLUTION

£169.95
+VAT = £195.44

14 INCH COLOUR MONITOR
Also available in TV/Monitor version at £195.95 + VAT = £225.34

LOOK!
NEW LOWER PRICES ON EPSON, STAR & BROTHER

DAISYWHEEL PRINTERS

BROTHER HR 15 ..... **CALL FOR BEST PRICE**
EPSON DX 100 ..... **£369.95 + VAT = £425.44**
JUKI 6100 ..... **£325.00 + VAT = £373.75**
DAISYSTEP 2000 ..... **£225.00 + VAT = £258.75**

DOT MATRIX PRINTERS

COSMOS JP80 ..... **£169.00 + VAT = £194.35**
EPSON RX 80 ..... **£198.95 + VAT = £228.79**
EPSON RX 80 F/T ..... **£228.95 + VAT = £263.29**
EPSON RX 100 ..... **£384.95 + VAT = £442.69**
EPSON FX 80 ..... **£319.95 + VAT = £367.94**
EPSON FX 100 ..... **£498.95 + VAT = £573.79**
STAR GEMINI-10X ..... **£189.95 + VAT = £218.44**
STAR DELTA 10 ..... **£319.95 + VAT = £367.94**
STAR RADIX 10 ..... **£498.95 + VAT = £573.79**

THERMAL MATRIX PRINTERS

STAR STX 80 ..... **£129.95 + VAT = £149.44**
BROTHER HR 5 ..... **CALL FOR BEST PRICE**
BROTHER EP 44 ..... **CALL FOR BEST PRICE**

Cables – Paper – Ribbons – Sheet Feeders
Tractor Feeds – Interfaces – *Call for Best Prices*

CREDIT CARD HOT LINE
01-482 1711

Access

Please add £10 + VAT for delivery
Post your cheques/P.O's to:

VISA

DATASTAR SYSTEMS UK

UNICOM HOUSE 182 ROYAL COLLEGE STREET
LONDON NW1 9NN
Telex 295931 UNICOM G

TAX-FREE EXPORT & DEALER ENQUIRIES WELCOME
MONDAY-FRIDAY 9-6 SATURDAY & SUNDAY 10-1

Personal callers welcome. We are situated by the junction of Camden Road by the railway bridge.

THE UNIQUE MSX SYSTEM ..amazing

When you buy your MSX computer, you enter a new dimension of Home Computing with software options on disk, ROM cartridge or cassette tape.
Peripheral options cover colour monitors, printers, disk

The Spectacular JVC HC-7GB

The HC-7GB personal computer from JVC is a new MSX machine designed for total compatability between other MSX machines and all MSX softwear. A highly advanced 64 K machine, the HC-7GB has three display modes offering RF, composite video and RGB outputs. The HC-7GB MSX personal computer from JVC is the final word in home entertainment.

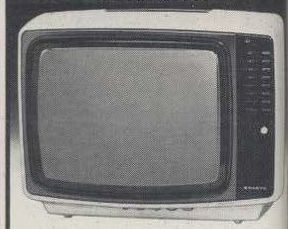
£275.00

JVC

THE JVC 7255 GB 14" COLOUR TELEVISION COMPUTER MONITOR

With full remote control **£269.95**

SANYO CTP3132 14" PUSH BUTTON COLOUR TELEVISION



The ideal budget price television for your home computer unit. Great value for money at SANYO **£179.95**

JOYSTICKS

For extra versatility and sensitivity in control there is a range of high quality joysticks available from these famous manufacturers offering such features as double trigger and suction stability pads.

SANYO MJY 002 £12.95

TOSHIBA HX-J400 £12.95

JVC HCJ615 £12.95

SONY JS 55 £19.95

SONY PRN-C41 PLOTTER/PRINTER

This Plotter/Printer produces red, green, blue and black images and characters. Pen replacement is easy and it takes a wide choice of paper sizes including FREE 'greetings pack' software.

SONY **£249.95**

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E. & O.E.

RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR NEAREST STOCKIST.
ANYTIME DAY OR NIGHT

versatility

drives, light pens, plotters, joysticks, data recorders and RAM cartridges from many top name manufacturers in the home electronics field.

Their performance offers you unrivalled graphic and sound quality together with outstanding simplicity of use.

THE INCREDIBLE FISHER CFB 1410 P MONITOR STYLE COLOUR TELEVISION

This superb, high technology 14" monitor style television has earned a high quality reputation as a reference in the field of home computer monitoring. It features a full 17 function infra red remote control housed in the front of the set. Other sophisticated facilities include direct audio/visual terminals in/out and smoked glass filter for perfect picture definition.

FISHER £269.95

SANYO DR201 DATA RECORDER

An AC only recorder styled for computer use with all controls conveniently placed on top of the machine for ease of use. **£34.95**

SANYO DR101 RECORDER

Specifically designed for use with personal computers, with phase shift switch, speaker monitor and AC/DC operation. **£34.95**

SONY TCM737 DATA RECORDER

A mains or battery operated recorder ideal for use with your home computer. **£39.95**

JVC HC-R105 DATA RECORDER

The stylishly designed HC-R105 data recorder is an example of a machine produced to offer superb user convenience, exceptional performance parameters and reliable data transfer. The HC-R105 is a high speed machine giving very short access times to data. **£89.95**

SOFTWARE

SOFTWARE STARTER PACK As a special introduction to your MSX computing, Toshiba offer a pack of 5 exciting computer games for **ONLY £30**

Pack consists of: ● 3D Golf ● Trick Boy ● Clapton II ● Pyramid ● Polar Star

(Offer only available while stocks last)

Individual games available at **£7.95 each**

SONY ROM CARTRIDGE SOFTWARE A range of sophisticated Sony Rom Cartridge Software is available at prices up to **£19.95**

KNIGHTS:

KNIGHT-OTHELLO £5.95
The classic game now on MSX.

VICIOUS VIPER £5.95
Eat the men but don't bite your tail.

EXPLODING ATOMS £5.95
A strategy game for two players.

SMASH OUT £5.95
With key or joystick control.

CAVE ADVENTURE £5.95
Negotiate the labyrinth of treasures.

MSX DEMONSTRATOR £5.95
Realize the potential of your MSX.

MSX GRAPHICS £5.95
Demonstrate your excellent MSX graphics.

TYPING TUTOR £5.95
Score by response to flashing keys.

JUNIOR MATHS £5.95
Teaches children to add and multiply.

MSX BASIC TUTORIAL PART 1 £5.95
Learn MSX Basic programming.

MACHINE CODE LANGUAGE £5.95
Write your own machine code programs.

KNIGHTS MAIL LIST £14.95
Store addresses and print labels.

BUDGET ACCOUNTS £14.95
Accounts with special forecast feature. (Available on disk or cassette).

KUMA:

DRILLER TANKS £8.95
Fight in tunnels fire breath Hectoriens.

BINARY LAND £8.95
Unite the couple in the complex maze.

FIRE RESCUE £7.95
Rescue the mice from a burning building.

ERIC & THE FLOATERS £5.95
Recover treasure from the evil floaters.

DOG FIGHTER £6.95
Blast enemy aircraft out of the skies.

HYPER VIPER £7.95
Avoid venomous vipers in the labyrinth.

SPOOKS AND LADDERS £6.95
Trap spooks in holes & escape the mine.

COCO IN THE CASTLE £6.95
Rescue the maiden from the king's castle.

CRIBBAGE £5.95
Play 6 card cribbage with your MSX.

HOLDFAST £5.95
A local politics strategy game.

HOME BUDGET £14.95
Control your home income and expenses.

WDPRO:– Wordprocessor £29.95
A professional quality wordprocessor.

DATABASE £19.95
A professional database program.

ZEN MACHINE CODE PROGRAMMING SYSTEM £19.95
Generate Z80 assembler language programs.

KUMA FORTH £39.95
A fully structured self extending language.

COMMUNICATIONS WITH VIEWDATA £19.95
Communicate through your modem.

SPEECH SYNTHESIS £69.50
(includes hardware card)
Typed in words can be spoken.

QUICKSILVA:

FRED £7.95
Fred's adventures under the pyramids.

BOOGABOO (The Flea) £7.95
Avoid a deadly dragon inside deep caves.

ANT ATTACK £7.95
Escape the ancient city fighting ants.

THE SNOWMAN £7.95
Build a snowman avoid Monsters & Flames.

GAMES DESIGNER £9.95
Modify existing or write your own games.

AMPALSOFT:

The "CHESHIRE CAT EDUCATIONAL SERIES" of programs will be made available to MSX users.

ABOVE ARE ONLY A FEW OF THE MANY PROGRAMS AVAILABLE FOR YOUR MSX BY MAIL ORDER OR FROM YOUR LOCAL STOCKIST.

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

MAXIS

AT HOME WITH TECHNOLOGY

THE UNIQUE MSX SYSTEM Complete

In the confused world of computer technology the unique MSX System has been adopted as a common standard for computer production by at least 16 of the biggest and best names in home electronics. This major breakthrough in the development of

The Sensational SONY HIT BIT

SONY

A 64K MSX Computer with an exclusive, built-in Personal Data Bank (firmware). This handy facility enables you to enter, store, recall and up-date all kinds of personal information such as appointments, addresses, telephone numbers, etc. Operation is simple, with instructions appearing on the screen every step of the process.

£299.95

Data from the Personal Data Bank can be saved on any data storage facility or on the **UNIQUE HBI 55 RAM CARTRIDGE**, available for **£39.95**

KV1430 14" MONITOR STYLE, PUSH BUTTON CONTROL TRINITRON COLOUR TELEVISION
with front mounted RF terminal. **£239.95**

HBD50 MICRO FLOPPY-DISK UNIT
stores up to 360K bytes of information on a 3½" disk. Easily connected to the Hit Bit by using one of the expansion slots. **£349.95**

The Superb SANYO MPC 100

This sophisticated piece of equipment offers all the advantages of 64K MSX computing, *(complete with 4 programme starter pack)* **£299.95**

Plus a unique optional feature – **MLT001 LIGHT PEN.** This provides you with unlimited flair and flexibility in colour graphics design. This feature comes complete with a software package containing some intriguing graphic facilities.

CBP 3000 14" MONITOR STYLE COLOUR TELEVISION
with removable smoked glass screen for higher definition.
£199.95

MLT001 LIGHT PEN
£89.95

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E. & O.E.

RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR NEAREST STOCKIST.
ANYTIME DAY OR NIGHT

compatibility...

Home Computing brings you complete compatibility in hardware and software. To cater for all home computing needs, Axis have selected in these pages an unbeatable, top value-for-money range of MSX computers, colour monitors, peripherals and software for you to choose from. "We believe that when you discover the benefits of MSX computing no other system will do".

The Star Value TOSHIBA HX10

The first MSX computer to be introduced into the U.K.

Offering superb facilities and outstanding value for the first time user or enthusiast. 64K Ram. 16 colour graphics, RF, video and audio connectors, plus ports for printer, disk drive and data recorder. *(Including starter pack software).*

£279.95

140E MONITOR STYLE COLOUR TELEVISION

The perfect partner for the HX10, providing excellent picture and sound quality.

£189.95

HX-P750 PLOTTER PRINTER

Easily connected to the HX10 through the printer interface. This printer features image and character plotting in 4 colours – red, green, blue and black – making it ideal for colourful graphs, pie and bar charts. Plotting speed is 285 steps per second.

£249.00

DR202 DATA RECORDER

Top of the range machine offering a host of high technology features.

£44.95

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AXIS

AT HOME WITH TECHNOLOGY

YOUR LETTERS

OU — BASIC IS BEST OK!

To counter your correspondents in the October issue who run down the ever popular Basic, there is another side to the debate. To take a small sample there are 23,000 Open University students with home micros, a third of them teachers and most of the rest in business and industry, with the following proportions 34 per cent BBCB, 15 per cent Spectrum, N per cent ZX-81, 6 per cent Commodore 64, 5 per cent Dragon, 4 per cent Apple, 4 per cent TI99, 3 per cent Tandy, 2 per cent each Vic20, Electron, 380Z, Atom, Pet, MZ80 and 1 per cent or less each of Genie, QL, Oric and others. They all have Basic as their *lingua franca* native language, which is easily converted from one dialect to another as Prestel, Ceefax and Basicode have shown; impracticable for other languages.

Indeed universal Basic common to all has Goto (stuff the pundits), Gosub, For.To.Step.Next, If.Then, so omit Procedure, Repeat. Until, While. Wend and Else which are not common to all. As they never teach you in 20 years, when you get down to it all, computers large and small only do three principal things:— they Loop, Branch and Gosub — equivalent to brackets in algebra; the rest is arranging input and output. As simple as that.

A recent survey among those OU students shows that 99.6 per cent do not want full time careers in computing but do "want to use their micros quickly and simply". So that means Basic, which after all was designed for that very purpose, so that the scientist, mechanic, executive or teacher could start programming within a day to help their job without a lot of elitist fuss.

It is also clear among those OU students that they have discovered for themselves, away ahead of academic staff, that programming their micros in Basic improves their studies and greatly increases their understanding of concepts in Maths, Science, Technology, Engineering, Social Science, Education, Business and Industry; and their time is at a premium.

The currently fashionable and transient structured programming and top down design — sacred cows if ever there was one; and what ever happened to yesteryear's fashionable algorithm — taught with Pascal in the OU's main computing course is a dismal failure with 51.6 per cent drop-out or failed — compare with 75 per cent normal pass rate — that is, 1163 students gave up costing £1 million of wasted resources of the taxpayers money. If the students were aircraft we would all be grounded; and if the staff who wrote the course were football coaches . . .!

It's comparable to the Army who ordered new boots and provided a sample, and then found they had 900,000 left boots only; with severe condemnation from the Parliamentary Audit Committee.

With "programs that generate programs" already on the wing there will soon be no need for these tedious, elitist and idiot fashions in structure and 30 languages; they will be as dead as yesterday's punched cards, in your lifetime. We are still in the Tiger Moth stage.

Sharpey,
OU Student,
Sussex.

AMSTRAD PEEK

In answer to Matthew Leach's letter in *Your Computer* September 1984, it is possible to peek the Amstrad CPC-464 ROM, but this must be done from machine code. The best way is to disassemble the ROM with a machine-code disassembler. Switching the ROM in with the following machine code routine.

```
ORG 4000H
CALL B900H
CALL B906H
JP start of machine-code
disassembler
```

The ROM can now be disassembled but if you return to Basic, the ROM is switched out.

M.J. Dyos,
Little Sutton,
Cheshire.

ZX-81 SPRITES

With reference to my Sprite program for the ZX-81 in the September issue of *Your Computer*, it is bug-free. However, owners of ZX-81s with the unimproved ROM will find that on running the demo program the Report Code C/100 appears. To rectify this problem the following Pokes should be carried out to the machine-code.

```
POKE 17403,82
POKE 17421,82
POKE 17435,82
POKE 17464,82
POKE 17468,82
POKE 17481,82
POKE 17485,82
POKE 17498,82
POKE 17575,82
POKE 17629,32
POKE 17695,41
```

Malachy Devlin,
Co. Tyrone.

HEX AND BUGS

I am the author of the Dragon Disco Lights program *Your Computer*, vol 4, No. 9. I would like to point out that my name is Ross not Ron as printed. Also I believe there

QL: THE BBC STRIKES BACK

I must protest at the gross inaccuracies and untrue sections of Kathleen Peel's second look at Sinclair's QL in the July issue. I quote ". . . In hardware terms, the QL currently represents the ultimate in technical achievement in the (under) £400 range . . ."

The BBC instantly springs to mind as a £400 computer; here is a comparison in hardware terms.

QL
Monitor and TV ports.
Up to 80K ROM.
Up to 640K RAM.
Up to 64 on network.
2xRS — 232 — 19200/9600 max.
2 x joystick port.

BBC
Monitor and TV ports.
Up to 256K Paged ROM.
Up to 16 megabyte RAM through Tube and 16032 second processor.
Up to 256 on network.
1 x LRS — 232 — 19200/19200.
Improved RS — 232
4 channel, 8 bit A/D converter.
1 Mhz Bus.
User port.
Tube interface.

The BBC is 1.5 time as fast as the QL. Now, which computer is the ultimate in technical achievement?

The QL may not have been on the market long, but the situation between the BBC and the QL currently is:

	QL	BBC
IEEE	Under development	two available
Modem	Under development	many available
Teletext	?	yes
Mhz bus	?	built in
User port	?	built in
Monitors	Special one needed	Any
Serial int.	2 x RS232	1 x RS432
Fastest TX	19200	19200
Fastest RX	9600	19200
Network	Does not work	Econet, E-net etc.
Max net users	64	256
IBM upgrade	no	yes
Teletext display	no	yes
Sound	?	4 channel, 8 octave
Max cols	8	8/16
Max res	512x256	640x256
Function keys	5	10 (40 with shifts)
Text	85x25	80x32
Fastest data transfer k/sec.	0.08	up to 62.5
Speech	no	yes
Languages	Super Basic	Basic, Forth, Lisp, Pascal BCPL.

The QL at this stage is totally outclassed, in every field. Given time, the QL will improve but for my money I'll take the BBC every time . . .

Stephen Corcoran,
Aylesbury,
Buckinghamshire.

is an error in the hex code; the line headed 24656 should read:

810B1027008620B6.

As I no longer own a Dragon I am unable to list this, but it should now be correct.

Ross Gardler,
Harel Grove,
Stockport.

NO COMPLAINTS

With reference to Mr Doug Bullen's letter in the September issue, I feel honour-bound to take exception to the statement that a computer's bugs are in direct proportion to the complexity and versatility of the machine.

I have owned a Memotech MTX-512 since November last year, and, to date, I have found no bugs. Perhaps the use of a Z-80A CPU, in Mr Bullen's opinion, places it outside the scope of a "versatile machine", or perhaps the inclusion of three languages resident in ROM, plus a front panel display and Logo-style graphics commands make it a little limited in his opinion?

D.J.W. England,
Wroughton,
Wiltshire.

Lines 10-170 of September's ZX-81 program were left out. They are supplied below:

```
 5 REM BARREL-BARRAGE
 6 REM MISSING LINES
10-170
 10 CLEAR
 15 DIM D$ (793)
 25 PRINT AT 6,24;
 30 POKE 16418,0
 35 FOR A = 1 TO 14
 40 PRINT "                    ";
 45 NEXT A
 50 PRINT "
"; AT 5, 18; "        "; AT 6, 12;"
 55 PRINT AT 22,31; " "; AT
21, 31; " "
 60 PRINT AT 0, 0; "SCORE:
000000"," HI: 000000","
LIVES: 5
 65 PRINT AT 18,22; "—"; AT
0, 0;
 70 PRINT TAB 13; "      "
 80 PRINT TAB 13; "      "
 90 PRINT TAB 13; "      "
100 PRINT TAB 13; "      "
110 PRINT TAB 13; "      "
120 PRINT TAB 13; "      "
130 PRINT AT 1,19; "      "
140 FOR A = 2 TO 4
150 PRINT AT A,19; "H H H"
160 NEXT A
165 RAND USR 17130
170 STOP
```

Many people may have a problem when typing in the game, "Track Chase" which was published in the October issue of *Your Computer*.

In listing 1, lines 120 and 130 contain some funny characters which are difficult to obtain. The lines should be entered as follows:

- Type the line in as shown with spaces instead of the inversed "N" characters.
- Cursor back over the spaces, press CTRL and RVS On and replace the spaces with shifted "M" characters.
- Press Return.

The Rem statements in listing 1 must be typed in.

EDITORIAL

TILTING TRAINS THAT only work on straight tracks, Bristol Brabazons and failed perpetual-motion machines don't get much of a look in when it comes to histories of great inventions of our time.

Accounts of technological advancements are always about people getting it right first time or stumbling across something important like the theory of displacement in the bath.

It would be a shame if chroniclers of home computing paint a picture of soaring achievement when we all know the real landscape is covered with low points littered with dodos.

For example, whatever happened to the Haven colour board for the ZX-81 which offered Spectrum colour at a price you could afford? Our review in the July 1982 issue found that this product didn't quite live up to expectations: "The screen went fuzzy orange and no cursor could be seen . . . Waves of a darker colour advanced down the screen and rippled the whole display."

Haven pluckily pronounced this problem "unusual", and suggested that the colour board performed differently with different TVs: "This was confirmed by testing the board supplied with a Bush, a Sony and a Ferguson. The poor-quality picture mentioned was obtained with the Bush, but no colour picture could be obtained at all with either the Ferguson or the Sony."

However, an alternative was being advertised in the same issue: "Now you can add a coloured background to your displays!" What silicon trickery lay behind this breakthrough? Yes, you've guessed it: "High quality PVC in either blue or green. Only £2.95+pp per pack of two."

If these hardware pioneers stand head and shoulders below the rest, then Warp Factor Eight's popular add-on reached new heights: "Lift off into '83 with Hi-Stak. It makes your computing easier, faster, more reliable, less exhausting and simply more enjoyable." In its day the Hi-Stak was the latest in lumps of plastic. For £3.95 a pair the Hi-Stak stick-on legs fulfilled the claims made for them in the adverts by propping up the Spectrum to a more ergonomic angle.

But software disasters have also played a major role in the alternative history of computing. Leaving aside Space Invader — where you endlessly destroy a solitary alien struggling down the screen — let us turn to another chapter.

Bridge Software's Vic Invaders, renamed "The massacre of the saucepans" in our June 1982 edition, was too easy: "The invaders do not advance, there are no mystery ships, the base at the bottom zips along at rocket speed, and the invaders do not speed up when only a few remain."

Alternatively, there was Petals Around The Rose: "a number guessing game with a difference — it does not tell you the rules" or Neme's pontoon program which did not recognise pontoon.

Computer manufacturers should also take their share of the credit. Remember Sanyo's enigmatic PHC range which appeared in October 1982 and disappeared again in November? Or the Grandstand Tutor, the Texet TX-8000 and the Comx 35, built around the RCA 1802 chip that was more at home in early guided missiles?

If you would like to nominate a product which you feel deserves a place in the home computing house of horrors, write in to "Off-white Heat", Your Computer, at the address below. We'll publish the worst of your entires, libel-lawyers permitting, and find sutiably awful prizes for the winners.

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticism of machines and software in general. If you would like to see your name in print, whether on a Software File program or a full-blooded article, here is how to go about it. Ideally, all articles should be typed double-spaced on one side only of uniform sheets of paper. If listings can be dumped directly from a printer — you can always use a friend's or user group's — this minimises the risk of error. In a perfect world a cassette would accompany the article. That considerably speeds up the checking process. Not only do you get to air your own discoveries and opinions, but we will even pay you for the privilege. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Why not give it a try? You have nothing to lose but your postage.

Editor
TOBY WOLPE

Assistant Editor
MEIRION JONES

Software Editor
SIMON BEESLEY

Production Editor
IAN VALLELY

Sub-editor
PAUL BOND

Editorial Assistant
LEE PADDON

Editorial Secretary
LYNN DAWSON

Editorial: 01-661 3144
Subscriptions: U.K. £12.50 for 12 issues.

ABC
154,334
January-June, 1984.

Printed in Great Britain for the proprietors Business Press International Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Tel: 01-661 3500 Telex/grams: 892084 BIPRESG. ISSN 0263-0686. Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Instep Ltd, London EC1.

Advertisement Manager
NICK RATNIEKS 01-661 3127

Assistant Advertisement Manager
NEIL MARCHANT 01-661 8548

Advertisement Executives
NIGEL BORRELL 01-661 3660
JULIAN BIDLAKE 01-661 8458
KAY FILBIN 01-661 8484

Northern Office
RON SOUTHALL 061-872 8861

Advertisement Secretary
MAXINE GILL

Classified
LUCY O'SULLIVAN 01-661 3036

Publishing Director
CHRIS HIPWELL

Group Advertisement Manager
SHOBHAN GAJJAR
Your Computer, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

© Business Press International Ltd 1984

Icon worshippers thrill to Island music

NEW PROGRAMS rarely cause excitement in the *Your Computer* office but The Music System from Island Logic had BBC enthusiasts shrieking with delight as they danced around the filing cabinets. Not only is The Music System the most advanced music program on the market it also uses Macintosh-style icon graphics to control the various elements.

Part 1 of System comprises a Printer and an Editor which allows you to word process with music — writing notes on staves and modifying existing tunes. The Editor had four voices including on disc percussion, 15 sound envelopes, choice of notation and automatic barline creation.

The Printer generates four-part music manuscript from your files so long as you have a Centronics printer. Part 2 has a Synthesiser which creates 30 tones which can be simultaneously edited on screen and a Keyboard which in addition to allowing you to use your QWERTY as a piano keyboard also allows you to record four tracks. There is also a sound and song library.

Each part can be bought separately on cassette for £13 or together on disc with a separate library disc for £25. The disc system also has a Linker module which allows you to combine single files into one piece.

This is Island's first computer program despite the fact that the company has had a dozen programmers slaving away over hot micros for the last year. A Commodore 64 version of The Music System is on its way amongst other products.

Putting a real plastic piano keyboard on the 64 gives Commodore's Music Maker an immediate appeal. For £30 you get the synthetic ivories together with a music book and a tape or disc of software which allows you to simulate eight voices with instruments such as guitar, piano and synthesiser. Set rhythms for bass or percussion backing are also available.

At the touch of a button

WHILE SPECULATION continued on whether Sinclair would upgrade the Spectrum or go for a cut down QL — "there are as many opinions on what should follow the Spectrum as there are people at Sinclair" says Nigel Searle — there seemed little chance that he would remember to include an on/off switch. There is not even one on the QL. So in the short term TEC of 24 Victoria Road, Bromsgrove, Worcestershire, are selling £5 plug-in on/off switches which clip on the top of your Spectrum. TEC claims that this positioning does not interfere with interfaces — but the Alphacom 32 printer, for instance, will not fit with the switch, and the really bad news is that not only does the new Spectrum Plus have no on/off switch but TEC switch will not fit either.

Yashica YC 64 MSX clone

CALLING ITS first home computer the YC-64 is a certain way for Kyocera to get its new MSX micro into the pages of *Your Computer*. Kyocera which makes the Tandy lap held computer amongst others is selling the YC-64 under the Yashica name which is better known in this country for cameras. The computer has the standard MSX bag of chips together with 16K video Ram and 64K system Ram.

YOUR COMPUTER TOP 20

Game	Company	Machine
Arabian Nights	Interceptor	BBC
Beach Head	US Gold	CBM 64
Decathlon	Activision	CBM 64
Decathlon	Ocean	CBM 64
Encounter	Novagen	Atari
Football Manager	Addictive Games	BBC
Frak	Aardvark	BBC
Full Throttle	Micromega	Spectrum
Jack and the Beanstalk	Thor	Spectrum
Jet Set Willy	Software Projects	Spectrum
Lords of Midnight	Beyond	Spectrum
Match Point	Sinclair	Spectrum
Micro Olympic	Micro User	BBC
Monty Mole	Gremlin	CBM 64
Psycho Shopper	Mastertronic	Vic-20
Sabre Wulf	Ultimate	Spectrum
Scrabble	Little Genius	CBM 64
Tornado Low Level	Vortex	Spectrum
Valhalla 64	Legend	CBM 64
Zaxxan	Adventure International	Spectrum

Electronic books from Tandy will run on BBC

ONE OF THE strangest stalls at the Motor Show in Birmingham's National Exhibition Centre is Tandy and West Midlands County Council's joint effort. In case you need documentary evidence you can win an "I'm no Wally" certificate in a road safety competition.

Somehow this is supposed to publicise Tandy's new electronic books which plug into the Tandy Colour Computer, or with an adaptor to a BBC Micro. The books have touch sensitive pages. A £20 music book called Professor Pressnote and a guide to the planets, Solar Explorer, which costs £17 are the first two releases.

New Sinclair looks like a sawn-off QL, performs like a Spectrum

SINCLAIR'S NEW Spectrum Plus or + as he prefers to call it is nothing more than a Spectrum in a new QL style box with realish keyboard and a reset button, plus six pieces of software Scrabble, Make a Chip, Chequered Flag, Chess, Vu-3D and the Tasword 2 word processor.

The keyboard is described as "professional" but despite company claims that Sinclair was "very keen to have a robust keyboard" ours had been amateurishly put together — several keys had fallen off and were rattling around the case. The price is £180 and to encourage people to buy the Plus rather than the standard 48K Spectrum the free software deal with the standard Spectrum will be discontinued in the next few weeks. The good news is that thousands of Pluses have already been built so this time there should be no "coming soon — 28 days and counting" saga.

16K Spectrum production is increasingly aimed at overseas markets but Sinclair claims that there are no plans to stop production of the standard machine. Sinclair will be making 200,000 computers a month this winter.

Sinclair is also marketing a £100 expansion system for the Spectrum. This consists of a ZX Microdrive, Interface 1, and four cartridges including an Introduction to Microdrive use, two "business" programs, Masterfile and Tasword Two, a blank cartridge and two of the best fun programs Ant Attack and Games Designer.

One final advantage of the Plus is that is that it is the first Sinclair that can stand on its own feet. The retractable legs give you a proper keyboard angle. The original Spectrum had none and the QL's continually fall out.

Be there at blast off

SPACE SHUTTLE computer malfunctions permitting three kids will win a chance to watch a space shot from Cape Canaveral next year.

Monitor maker Microvitec is sponsoring a Cub British Schools National Computer Challenge open to teams of three contestants who must be 16 years old or less. The winners will have an all expenses paid five day trip to Florida including the shuttle launch.

Million pound bait one that got away

"EVERYONE'S JUMPING on the one million pound bandwagon" is Commodore's excuse for launching Spirit of the Stone — a treasure hunt for the Commodore 64 with a potential seven figure prize for the winner.

The £15 program and book set contains a series of arcade games which gives clues to the whereabouts of 40 talismen hidden on the Isle of Wight, each containing a single diamond. Commodore is putting 50p into the royalty fund for every cassette sold — the fund will be closed when all the talismen have been discovered or when the fund reaches £1,000,000 or failing that in 1993. Program crackers may well have an advantage over those who stick by the rules. Short of the Isle of Wight slipping silently below the waves of the Solent during an earthquake the talismen will be found well before 1993.

The million pound target is equally unlikely to be met — Commodore would have to sell more copies of Spirit of the Stones than all the 10 best selling computer games so far put together.

Not the right Habitat

IMAGINE BUYING a computer sprayed a tasteful primary colour or perhaps covered in raffia. Habitat carried out a feasibility study but decided that computer fanatics were boring people who were not prepared to pay more for trendy looking micros.

Expansion is kids' stuff

REMEMBER My Talking Computer — now there is a new £18 120K expansion module for it which contains music, sentence making, digital time, alphabet colour, shape and size amongst its programs.

Christmas is cancelled

CHRISTMAS IS CANCELLED this year and that's official. Well the *Your Computer* Christmas Fair is anyhow. The Fair which was scheduled for November 30 through December 2 at Olympia has been cancelled because most of the games and computers which used to be mail order are now available through high street shops.

From the outside it looks like a perfectly normal £40,000 Aston Martin Tickford Trekker van but another way of looking at it would show you that it is the most expensive Apple Macintosh on four wheels. At the centre of the van sits a Mac with printer surrounded by the sort of accessories every computer user has come to expect — radio phones, drinks cabinet, raised roof viewing platform, sink, stereo, drinks cabinet and swivelling leather chairs.

QUALITY GAMES WANTED FOR

blaby computer games

SPECTRUM, ATARI CBM 64, VIC 20, DRAGON 32 SEND NOW!

£1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99 £1.99

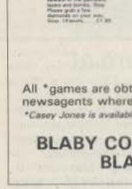
ANNOUNCE THEIR OWN POCKET MONEY RANGE. MORE FUN AT LESS PRICE

DRAGON USERS. SEE US AT THE 6809 SHOW NOVEMBER

All *games are obtainable from the company @ £1.99 plus 50p postage & packing or from computer and video shops everywhere. Also newsagents where you see the Slush Puppie sign. Send SAE for full list.

*Casey Jones is available from W.H. Smiths, Menzies and all major stores at £5.50.

BLABY COMPUTER GAMES, CROSSWAYS HOUSE, DEPT YC, LUTTERWORTH ROAD, BLABY LEICESTER. TELEPHONE 0533 773641 TELEX 342629 JRHHG



COURSEWINNER

The Punters Computer Program

COURSEWINNER allows you to use the power of your computer to get the edge on the bookmaker.

- COURSEWINNER contains a database full of detailed information on all English and Scottish flat courses. The ten leading jockeys and trainers, and effect of the draw is detailed for each course.

This information can be displayed on the screen at any time.

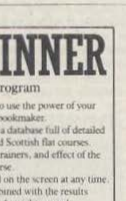
- The program analyses these factors combined with the results of the last three outings, starting price and weight carried.

- COURSEWINNER is simple and quick to use, yet very powerful.
- Boxed with detailed instruction booklet.

Price £12.50 all inclusive IMMEDIATE DISPATCH (RETURN OF POST)

Available for:
SPECTRUM (48K), BBC (B), COMMODORE 64, DRAGON, APPLE II/IIe, ATARI (48K).

POOLSWINNER



The Ultimate Pools Prediction Program

- POOLSWINNER is the most sophisticated pools prediction aid ever produced. It comes complete with its own massive database.
- Can be used for Scoredraws, Draws, Aways and Homes.
- The database contains over 20000 matches (10 years league football). It updates automatically as results come in.
- The precise prediction formula can be set by the user. This allows development of your own unique method.
- Package is complete with program, database and detailed instruction booklet.

Price £15.00 all inclusive IMMEDIATE DISPATCH (RETURN OF POST)

Available for: SPECTRUM (48K), ZX81 (16K), BBC (B), COMMODORE 64, DRAGON, APPLE II/IIe, ATARI (48K). Now also for AMSTRAD CPC 464, IBM PC.

Available from dealers or direct (return of post) from:

VISA PHONE

selec SOFTWARE

ACCESS PHONE

37 Councillor Lane, Cheadle, Cheshire. Phone: 061-428 7425

"THE FRIENDLY TO USER STORE"

FOR THE BEST COMPUTER SUPPORT

SOFTWARE★HARDWARE★REPAIRS

SPECTRUM★CBM 64★VIC 20

AND OTHER MACHINES

MICROWARE THE FRIENDLY TO USER STORE

★NEW SHOP OPENING★

7, LEICESTER ROAD
LOUGHBOROUGH
LEICS

SATURDAY 13th OCTOBER

MANY SPECIAL OPENING BARGAINS

Also see us at the following markets!
PETERBOROUGH, CAMBS
Tuesday
STAMFORD, LINCS
Friday/Saturday
DONNINGTON PARK, LEICS
Sunday
WHITTLESEY, CAMBS
Sunday
Soon in **CHELMSFORD** and area
(Ring for Details) and more to come!

OVERSEAS Associate Company
MICROWARE SYSTEMS (PTE) LTD
01-66, ORCHARD PLAZA,
150, ORCHARD ROAD, SINGAPORE

OVER 2½ YEARS IN THE HOME COMPUTER SPECIALIST BUSINESS AND STILL LEADING THE WAY!

MICROWARE 5, St. Peters Lane, Leicester
Tel: 0533 29023

I could do that...

For this month's competition we would like you to write a Basic Fill routine. It should accept two inputs — giving the x and y co-ordinates of a point within an enclosed shape — and then proceed to fill in all the pixels within that shape. To make your task easier the routine only needs to handle convex figures — that is, figures whose outlines do not "turn in".

Perhaps the simplest aproach to the problem is to move from top to bottom filling in horizontally up to the left and right outline. Another possibility is the "grass-fire" method where you spread out in all directions from the centre, keeping a record of filled pixels in an array.

Whatever approach you adopt you will need some way of detecting what is on screen. Spectrum and BBC owners can use the Point command while Commodore owners will have to Peek the screen memory. On the ZX-81 you can use
PEEK 16396 + PEEK 256*16397
to find the start of the display file.

In awarding the £15 prize we will be looking for programs that do the job quickly and in as few lines as possible. Obviously if your machine already has a Fill command we expect you to ignore it.

September's competition asked you to write a program which would conduct a conversation between you and your machine. Some highly amusing conversation pieces were sent in. Typically the dialogue took an abusive turn with the computer heaping scorn on human intelligence. Most of these were, unfortunately, too long to print. Although the programs kept within the 20-line limit their Data statements were massively long.

Instead we plumped for a mini-version of Animals by Andrew Babbington, 31 Glen Iris Avenue, Canterbury.

BEGINNERS *first bytes*

Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.

Robots

EVERYBODY KNOWS what a robot is. It is a machine with arms and legs and a tinny voice. If it is really good, it might make it into the android class. That, anyway, is the picture most people have from films and books. The reality is slightly different, though there are signs that it will become just as exciting over the next few years.

Surprisingly, the idea of a robot has been around for more than 60 years. The word was first used by the Czech playwright Capek in his play *Rossum's Universal Robots*. Robot comes from a Czech word meaning "work". The next landmark was in the 1940s, when the American writer Isaac Asimov formulated his three Laws of Robotics:

- A robot may not injure a human being, or through inaction allow a human being to come to harm.
- A robot must obey the orders given to it by human beings, except where such orders conflict with the First Law.
- A robot must protect its own existence as long as such protection does not conflict with the First and Second Laws.

Robots became a reality in the 1950s. They usually consisted of hydraulically controlled arms that performed a fairly simple task again and again, without variation.

In many ways, these first robots were simply glorified pieces of machinery that you might find on any assembly line. The big breakthrough came when the newly-developed computers were hooked up to robots. This gave them a certain life of their own and brought them one step closer to the all-singing, all-dancing metalman.

A true robot has three basic properties. Apart from the mechanical

(continued on page 47)

Andrew Babbington's winning mini-version of Animals.

```
100 DIM A$(512)
110 LET A$(1)="fox"
120 LET N=1
130 PRINT "Think of an animal..."
140 IF A$(2*N)<>"" THEN GOTO 250
150 PRINT " Is it a ";A$(N)
160 INPUT X$
170 IF X$="yes" THEN PRINT " One up to me!!"
180 IF X$="yes" THEN GOTO 120
190 LET A$(2*N)=A$(N)
200 INPUT "  Then what is it";A$(2*N+1)
210 INPUT "  Give me a question that would be true f
or a "
220 PRINT "  ";A$(2*N+1);" but is false for a ";A$(2
*N);" ..."
230 INPUT A$(N)
240 GOTO 120
250 PRINT "  ";A$(N);
260 INPUT X$
270 LET N=2*N + ABS(X$="yes")
280 IF N<256 THEN GOTO 140
290 PRINT " Too much, I quit!"
```

More exciting games for your ZX

Athlete
So you didn't make the Olympics? Never mind, here's a selection of track and field events where you can show the selection how you compare against several other opponents. Sprints (100m & 400m), Hammer, Throw, Hurdles, 1.0m & 400m.

Super Bridge
For beginners and experts alike. Designed to give above average opponents good value for their money and to give beginners an excellent introduction without the worry of an impatient partner.

Make Music
A music synthesiser, program designers to compose 3 part harmonies when used with the Bin, Pulse and Timedata sound boxes, or any video game the AY 3-8912 chip where the "OUT" command is known. Brilliant - ZX Chronicle

Buffer Adventure
Featuring the real life characters who work at Buffer Micro. Dare you question the legitimate behind the shop? Are the people who serve you quite as sound as their words? An amusing page before adventure

Mysterious Fairground
All the fun of the fair. Play amusement games in the House of Horrors and the Ghost Train before you can find the five items of treasure hidden somewhere in the Fairground

Pools Predictions
Score draws, or no draws, home and away wins or the novel correct program to help you fill in the winning coupon. English/Scottish leagues and Australian leagues for all your football needs

Racing Predictions
Claim the title as top punter of the lunch of the forthcoming all the major national meetings in this user friendly confidence program. Pick the first three home with confidence

Card Games
CHEMMAKE is the most fascinating of the games, fairly cool in snap, nine to Challenge - sudden death. Also in the game: Blackjack, PAIRS, BINGO and PATIENCE.

Loony Bin
Mad adventure requiring cool logical thinking to escape from the asylum and travel the world following the clues. Takes all but 16 pence of the Spectrum's 48k memory

FREE Blank Tape with every purchase

All prices include VAT. Add 75p p&p or call in person at Buffer. Trade enquiries welcome. Visa. Access. American Express. Diners Club.

Please send me the following games:
☐ Athlete ☐ S. Bridge ☐ Music ☐ Adventure
☐ Myst. Fair. ☐ Pools Pred. ☐ Racing Pred.
☐ Card Games ☐ Loony Bin

Name _____
Address _____
_____
_____
I enclose cheque/PO for
£ _____ YC

BUFFER MICRO SHOP
310 Streatham High Road, London SW16 6HG Tel: 01-769 2887
Open Tues-Sat 10-30-5.30 (Closed Mon)

The Complete
Machine Code Tutor

Trust New Generation to strip the mystery away from Machine Code. Now the Complete Machine Code Tutor makes learning machine code simple so there's never been a better time to discover the really great benefits of machine code programming – see what the press says.

"A colourful, clear, interactive computer teaching package – the best I've come across in any field."
Jan Watterson **Popular Computing Weekly**

"This pair of tapes forms a worthy addition to the range, giving a thorough exposition from the most elementary level of machine code programming on the BBC Micro."
Which Micro & Software Review

"The best machine code tutor and no serious Spectrum programmer should learn machine code without it."
Crash

"By far the best attempt comes from New Generation Software who has recently issued its Complete Machine Code Tutor for the BBC and the Spectrum."
Popular Computing Weekly

"New Generation have got a very nice product here. It's well thought out, easy to use, aesthetically pleasing, and (as far as I could tell) bug-free and crash-proof."
"Overall then, an excellent idea, well executed."
Computing Today

Supplied with full notes, this package teaches machine code the way it should be taught – at your own pace and actually from the microcomputer, not from a book. You learn programming the professional way, plus a few tricks of the trade. Available from all good computer stores at £14.95.

New Generation Software

New Generation products are sold according to their terms of trade and conditions of sale.
FREEPOST, Bath BA2 4TD. Tel: 0225 316924

WHSMITH John Menzies WOOLWORTH Spectrum

BEGINNERS first bytes

(continued from page 45)

side of things you need some sort of sensory device to tell you what that mechanism is doing, for example how far it has moved its arm. Then you need a computer to analyse that information, decide what to do on the basis of it, and instruct the mechanical parts accordingly.

The same basic principles apply to home robots. To qualify for membership of the robot club, they need some kind of mechanical action controlled by a computer that can react to the outside world. Mechanical action includes simply moving.

Perhaps the simplest examples are some toys from Prism. These micro-robots respond to sound or infra-red light by hopping or wheeling along. In this case the mechanical element is slight, as well as being pretty useless, so the computer power is also small. But they do fulfil all the requirements.

More sophisticated home robots include models like Hero, Topo and RB-5X. They are also rather more expensive, costing up to £3,000 – so robotics has a long way to go before you can buy the equivalent of Sinclair's £100 Spectrum micro.

Topo is actually more of a robot peripheral than a true robot. It has no independent computational power on board, but is controlled via infra-red signals from a standard Apple II computer. Topo has a younger brother called Fred who is even dumber – aren't they all? He can just about manage to hold a pen and draw with it, which is hardly in the R2-D2 class.

Hero and RB-5X are very similar to each other in design. They both have an on-board processor, a robot arm, and various sensors. Hero has a sound sensor and a light sensor. RB-5X also has bumper devices around its base to detect collisions. Both machines can be programmed to respond to feedback from the outside world.

For example, you could get the robot to move around a room, manoeuvring its way as it bumps into objects. It could then store the layout of the room and the objects, and so avoid them in the future. Or you could program it to move towards the brightest light in the vicinity, or even to the nearest human being, using its infra-red sensors to detect heat given off. Eventually robots could be used in the home as untiring watch dogs, responding to the slightest noise, light, or heat from human bodies.

The big breakthrough in home robots will come when they can respond to spoken commands. After all, it's not much fun having a robot do everything for you if you first have to program it in machine code. The first few steps have been taken in this direction. For example Hero has a voice output facility which allows you to create words and sentences.

The home robot has some way to go before it is an everyday sight, but some people think that the situation now is rather like that of micros about 10 years ago. The models that are around are crude and not very powerful, but with great promise. So far it has been hobbyists who have bought them, quite content to get down to the nuts, bolts and chips level. But the next generation of machines could be as cheap and as useful as micros are today.

If you want to get a taste of this world, but can't quite afford the £1,600 for Hero in kit form, there is an alternative. For some years now, the micromouse competition has been flourishing in this country and abroad. A micromouse is a small powered device with sensors and an on-board computer, that tries to find its way to the centre of a maze. It is, in fact, a fully-fledged robot.

To build your own, you could do worse than follow the example of Alan Dibley, the U.K.'s leading micromouser. He uses plywood, balsa and card for the chassis, infra-red detectors and old Sinclair computers – literally sawn-off to fit on the wheeled assembly.

A micromouse competition is held each year at the Earl's Court Computer Fair in June. Alan usually wins. If you feel like challenging him, you can obtain more details of the micromouse competition by writing to John Billingsley, Department of Electrical and Electronic Engineering, Portsmouth Polytechnic, Anglesea Road, Portsmouth PO1 3DJ. Entry is free.

Speech synthesis/ recognition

MOST HOME COMPUTERS will make a noise at you if you try hard enough. Some, like the BBC Micro, have a full three channels of music to serenade you with. Making your micro talk is a little harder, but by no means impossible.

As with most things to do with computers, the secret is to spoonfeed it. Words are broken down into their basic components. The micro then produces each of these, one after another. The fundamental elements of spoken words are called phonemes – hence the saying "don't phoneme us, we'll phoneme you".

For example the word "speech" has five: one each for "s", "p", "ee", "t" and "ch". It is relatively straightforward to program a micro to accept words broken up into these elements, and then to produce something like the right sound. The effect is the "I am a Dalek" sort of voice. Speech synthesis units are available for many micros including the Spectrum and BBC.

To get a micro to produce spoken output directly from the word itself is much harder. At the moment only relatively large systems can even begin to try to cope with the problems.

These are easy to describe and difficult to solve. Basically the spelling system of the English language is a mess. Just consider the group of letters "ough". How is a computer to cope with pronunciations as different as "though", "rough", "bough", "thorough" and "through" – not to mention "hiccough", pronounced "hiccup"?

The answer is that the computer has to do it the way we do it, by the context of the surrounding words. This leads us into the realms of Artificial Intelligence, and an area where research is only just beginning to produce results. Clearly, though, the benefits could be enormous. For example it would be easy to adapt any program to work with the blind, giving verbal messages or warnings. It would be possible to scan a printed document or book and have the micro "read" it out, doing away with the need for costly Braille books.

If a computer could give spoken messages, it would obviously be convenient if it could also obey spoken commands. The difficulties here are even greater than with speech synthesis. First there are technical problems of picking out the speech from the background noises. Slurring is a problem too. You may think you say "Africa and Asia" but most people actually say something nearer "Afrika rand Asia". Finally, and worst, we have the problems of ambiguity: did you say "there" or "their"? Again, the only answer is to endow the micro with a bit of intelligence.

Rather than go the whole AI hog, there is a half-way house. You can train a computer to recognise a particular voice, saying a limited number of particular phrases. You do this by repeating a phrase several times, and letting the micro take a kind of audio average of the sound. This is stored together with the appropriate command it represents. When a spoken phrase matches this average closely enough, the micro will respond by carrying out that command.

Apart from the difficulties of distinguishing similar sounds, there is also the slight problem that this system only responds to the basic words it knows. So "delete" and "don't delete" will have the same effect on your precious files. Which is why you really need to give your micro that bit of intelligence. ■

PRINT-SP | ROM 81 | PROMER 81 S | MONITOR STANDS | MULTEPROM | BLOPROM-SP | DHOBI | PRINTER STANDS

PROMER 81 | P10 81 | NIKE 81 | P10 SP | MEMIC | CRAMIC-SP | ROM SP | CRAMIC 81 | BLOPROM-81 | PROMER SP

CAMEL PRODUCTS

EPROM PROGRAMMER

AT LAST! for the Spectrum user. Put your programs, utilities, Assemblers into EPROMS for instant load from the unique ROM-SP

ROM-SP **for Spectrum**
Ingenious unit for Spectrum, with 2×28 pin sockets and a Reset button allows up to 16K of Basic or M/C program to RUN or LOAD instantly from EPROMS. Cabled connector and full extender card. NOTE: Does not disable Sinclair ROM. £29.95

PROMER-SP **for Spectrum**
A brand new Spectrum programmer for 2764/128. Zero insertion force socket & software on tape. £29.95

PROMER 81-S **for Spectrum**
The very popular PROMER-81 for the ZX81 has been adapted to the Spectrum and the price kept low. **NEW PRICE** £24.95

ROM-81
Provides two 24 pin sockets for up to 8K of EPROM memory in the 8-16K area. Can use 2516/32 or 2716/32 £14.95

PROMER-81
A low cost reliable programmer for 2516/32, 2716/32 EPROMS. Requires 4×PP3 batteries NEW PRICE £24.95

DHOBI 1 **UV ERASER**
Compact. Mains powered. Safe. Fully cased. Up to 3 EPROMS £18.95

DHOBI 2 With automatic timer £22.95

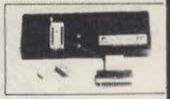
CRAMIC-SP **NEW** **for Spectrum**
Ingenious software paged 16K non-volatile CMOS RAM to co-exist in the same area as Spectrum ROM. Easy storage and retrieval of BASIC, M/C or DATA on a 48K Spectrum £89.95

PRINT-SP **NEW** **for Spectrum**
Centronics Interface with standard centronics Cable. Plus free introductory offer SP WRTIE text processor. £51.25

NIKE **NEW** **for Spectrum/ZX81/ATMOS**
Simple to use, rechargeable nickel-cadmium back-up power supply unit providing OVER 30 minutes extra life in the event of mains failure. £17.35

BLOPROM-SP
A uniquely sophisticated EPROM PROGRAMMER

Eprom programmer for the 2516, 2716/32/32A/64/64A/28/128A, yes even the 64A/128A from Intel. Check, Read, Program & Verify all or part of Eprom.
So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-SP. No Personality Cards, or other additions, just a Spectrum. Several inbuilt safety features. On-board Vpp generation. 28pin ZIF socket. Cabled connector and extender plug. ABS case. £89.95



```
STATUS    NO OF SYSTEM —HEX
          EPROM TYPE —27128
          RAM START ADDR —4000
          EPROM ST ADDR —0000
          JOB LENGTH — 4000
          TASK — CHECK
WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO
   RAM
Y) BLOW AN EPROM WITH DATA FROM
   RAM
Z) VERIFY THAT EPROM DATA IS THE SAME
   AS IN RAM
Q TO QUIT                  R TO RESTART
TAST CODES AVAILABLE
D   H   POR   WXYZ.
```

BLOPROM-81
As above but for ZX81. Programs 2516, 2716/32/32A/64 & 27128 £79.95

DREAM-81
64K Rampack with link options to disable 0-8-16K. Plus a 28 pin EPROM socket for 2716, 2732/2764 and 27128. £58.95

MEMIC-81
4K CMOS RAM with lithium battery. Easy SAVEing, 10yr storage and instant retrieval of programs. £29.95

INTRODUCING MULTEPROM
The most economical, sophisticated gang copier in the world. Based on BLOPROM £199.95

PRINTER/MONITOR ACCESSORIES

MSB Monitor Stand for BBC
17"×12"×3.75"
P&P £3.50 £19.95

PSS Standard printer stands for OKI. Epson etc. 15"×12"×4.5".
P+P £3.50 £16.95

PSC-3 for Epson MX-100 etc. 21"×14"×3.75".
P&P £3.50 £22.95

POT Printer Output Tray for 11" fanfold paper
P&P £3.50 £16.95

UK. VAT extra. No VAT on exports P+P UK Free Europe +5% — Overseas +10%. TLX 81574 CML

Cambridge Microelectronics Ltd. One Milton Rd. Cambridge CB4 1UY Tel (0223) 314914

★ NOW AVAILABLE FOR THE AMSTRAD CPC 464!!

WIN THE POOLS?

SPECTADRAW 3 – THE LATEST VERSION OF THE ORIGINAL AND BEST POOLS PREDICTION PROGRAM FOR THE 48K ZX SPECTRUM!!

AND NOW . . . AMSTRA-DRAW – THE FIRST POOLS PREDICTION PROGRAM FOR THE AMAZING NEW AMSTRAD CPC 464!!

- Supplied with Database containing data on over 10,000 matches since 1980!
- You update the Database each week – but no tedious typing, as team and division names already in program!
- Errors easily corrected – the program even checks your entries!
- Comprehensive instruction manual and menu driven program – easy to use, even for a newcomer to computing!
- Will forecast the least likely draws for those who prefer to bet on fixed odds!
- Built in perm generator – complete your coupon direct from the screen!
- Fully microdrive compatible! (Spectadraw only).
- Compatible with Currah Microspeech – the first pools program to read you its predictions! (Spectadraw only).

Spectadraw 3 for the 48K Spectrum ..... £9.95 inclusive
Amstra-Draw for the Amstrad CPC 464 ..... £9.95 inclusive
(Cheques/P.O.s payable to B. S. McALLEY)

We dispatch every Monday with the database made up to include all matches up to the date of dispatch.

SPECTADRAW (Dept Y C), 1 Cowleaze, Chinnor, Oxford OX9 4TD. (Tel: 0844-52426)

SINCLAIR, ATARI
COMMODORE

COMPUTER REPAIRS
by the
SPECIALISTS

Walkers
COMPUTER SERVICE AND REPAIRS
Telephone: (021) 643 5474
Telegrams: Shiplog Birmingham
Telex 337124 TWSLOG G

WALKERS will repair your MICRO quickly and efficiently.

Services available to suit the Customers requirements include "one-off" repairs and Quotations.

Most Repairs will be in the range
£15 to £30
subject to machine

FOR INFORMATION
PHONE 021-643 5474

CALL IN AT
58 OXFORD STREET, BIRMINGHAM, B5 5NX

OR SEND S.A.E. FOR DETAILS

If you have anything of interest to tell us about your computer club why not contact us on 01-661 3144.

Local news

Leytonstone

The East London Amateur computer club has catholic tastes; it caters for all micros, from Nascoms to Apples. It meets on the second and fourth Tuesday of each month. The venue is the main hall of the Harrow Green Library, Leytonstone. Interested parties should ring Fred Linger on 01-554 3288.

Orpington

State-of-the-art Orpington Computer Club can be contacted on Mailbox No. 068931263, or further details can be accessed on Clubspot 800 on frame 800841142. However, if your technology is still firmly rooted in the past you could always trying phoning Tony Self on 0689 31263. They meet at Christchurch Hall in Charterhouse Road, Orpington every Friday. The club caters for a wide range of machines and interests.

Congleton

Congleton and District Computer Club meets on alternate Mondays at "Heather Brae", Sandbach Road, Congleton. Hardware and software discounts are available to members and a wide range of projects are under way using BBCs, Spectrums and Commodores. Contact Tony Harratt on Cheshire 6758.

Chinor

A new user group has been set up in the Chinor and Thame area of Oxfordshire. Users of all ages and machines are welcome. The group organises lectures, competitions and games evenings. It also hopes to start a library. It meets every other Thursday at Mill Lane School Hall, Chinor. Further details from Bryan McAlley on 0844 52426.

COMPUTER *club*

Lee Paddon finds himself depressed in an out-of-season Southend-on-Sea until he discovers the secret of BBC's Elite at the local computer club. Perhaps he could give Simon Beesley some tips — see page 60.

SOUTHEND-ON-SEA can be a depressing place out of season. The still-lit illuminations glare mournfully down on any remaining tourists who might have got the month wrong and still be found wandering along the seafront.

Just a few yards along the seafront from the pier stands the Esplanade Hotel, looking suspiciously like a large pub. It is also the home of Southend Computer Club which can be found by entering "Go North" after you reach the bar.

Robin Knight is the chairman and one of the founders. The club was formed back in the low-res black-and-white days of 1979 when Acorn Atom's and TRS80's were the staple diet. The club meets every Monday night from 7.30 to 10.30 and has now grown to 86 members.

There was nearly as much noise coming from the club as the neighbouring amusement arcades. Decathlon is popular at the moment and several young Olympic hopefuls were furiously waggling joysticks; definitely not a game to be undertaken without rigorous training and a thorough medical beforehand.

Simon Rush was showing a clean pair of heals or a deadly pair of lasers to all comers in Acornsoft's new Elite game. He had attained the dizzy heights of competent, and a pretty gruesome array of accessories for his ship with three days continuous play. "Well, two-and-a-half really, my Saturday job got in the way". His tip for budding Elite players was very much down to earth: "Save the game whenever you dock"; even the aces sometimes need a quick spot of reincarnation.

Chris Pitt demonstrates his insurance quotation system based on a Galaxy 3 micro.

Robin Knight explained "a lot of games playing goes on at the moment but we hope some more serious work can take place once we move to our new venue at the Rocheway Community Centre. They've got 13 BBCs hooked up to an Econet system. We can also lock the games players into a separate room while we get on with the more serious stuff in peace and quiet." One of the club's first jobs will be to write some educational software to exploit the teaching potential of the Econet system and possibly help other members of the centre take an interest in micros.

Enough of future plans. At the moment the club struggles along with a collection of black and white T.V.'s and a large toolbox. However, this lack of equipment was made up for by the members who seemed to favour disc drives.

This apparent affluence might have something to do with Steve Sullivan, one of the club's founders, who runs a local shop called Estree Software which offers generous discounts to club members.

There was a notable lack of copying going on. Robin Knight explained "At the last meting we decided to outlaw it. We simply switch off the computer of anyone seen doing it. This seems punishment enough as it takes a fair amount of patience and hard work to copy a program."

Away from the games players, Stig was demonstrating his dexterity with a screwdriver and a soldering iron as a tape recorder underwent emergency surgery. By the end of the evening the patient was alive and well again and demonstrating a program analysing Stig's taste in contemporary music in terms of a line wandering around a telly screen driven through his Spectrum's ear socket. "I started mending really old tape recorders but my Mum decided I should get up to date and so she bought me a copy of *Your Computer* — the first time." Needless to say Stig has never looked back.

For more information about the club, contact Robin Knight on Southend-on-Sea 335747.

The Spectrum section in full swing — the game's the thing.

FOR DRAGON AND TANDY USERS

SATURDAY 17TH AND SUNDAY 18TH NOVEMBER
10 A.M. UNTIL 6 P.M.
THE ROYAL HORTICULTURAL HALLS

If you own a Dragon or Tandy colour computer this is your show.

The first ever show organised in the United Kingdom for these machines.

All the very latest hardware, software, interfaces and peripherals will be there. Your chance to get up to date, try and buy all thats new.

We'll also be organising events and competitions with great prizes. The manufacturers will be staffing advice centres to help with all your queries.

Exhibitors will have special offers on their products so you can save money too!

Large gangways and comfortable rest areas will make sure you can see everything and sit in comfort when you want.

This will be a show for the whole family, plenty to see and plenty to do.

If you want to miss the queues just clip the coupon below.

Computer Marketplace (Exhibitions) Ltd. Part of the Rushworth Dales Group, 20 Orange Street, London WC2H 7ED.

HOW TO GET THERE

The Royal Horticultural Halls are just off Victoria Street a few minutes walk from Victoria or Parliament Square.

Buses 11, 24, 29, 70, 76 and 88 run up Victoria Street.

Mainline stations; Waterloo, Charing Cross and Victoria.

Underground stations; St. James park (District and Circle lines), Victoria (District, Circle and Victoria lines).

There is an NCP car park in Abingdon Street, a few minutes away.

To: Computer Marketplace (Exhibitions) Ltd, 20 Orange Street, London WC2H 7ED.

Please rush me _____ (qty) adult tickets at £2 each and _____ (qty) tickets for under sixteen year olds at £1 each for the 6809 colour show. I enclose cheque to the value of £_____

Name _____

Address _____

Postcode _____ Telephone _____

6809 is the registered name of Motorola Ltd.

Star chart

Battle of Midway

PSS
Wargame
CBM-64
£9.95

★ ★

A flawed attempt to recreate the famous Battle of Midway. All you have to do is sink the four Jap carriers and they all troop off the map, victory to you! Well, that's the idea. So how come after sinking four carriers you then get hit by their aircraft and lose the game? Some nice touches of presentation, easy to order units Eastern Front fashion, but fatally flawed as a simulation.

H.E.R.O.

Activision
Shoot-'em-up
Spectrum
£9.99

★ ★ ★

Assuming anyone ever goes down a coal mine again, you may be called upon to rescue them if they get trapped. Our hero has to drop down mine shafts, blowing up a wall here, zapping a nasty spider there, and so on till he saves his man. Sounds simple enough, and it is to start off with. However, each successive shaft is harder. In some the walls are deadly, in others you can't even see the walls!

Ancipital

Llamasoft
Arcade Adventure
CBM-64
£7.50

★ ★

A silly scenario. A crack squad of Ancipitals have to go around breaking down walls whilst various other things try to stop them. There are 81 rooms in all. Fast, with good graphics and sound. Not terribly original, but enlivened by the usual Jeff Minter humour. The way you knock down walls changes with every room, movement and firing is a bit tricky.

SOFTWARE Shortlist

Interdictor Pilot

Supersoft
Commodore 64
Simulator
£17.95

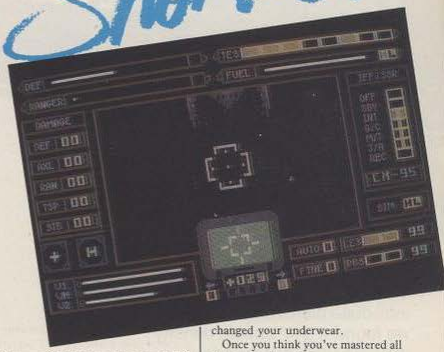
★ ★ ★

SIMULATOR AFFICIONADOES need no longer feel earthbound. Interdictor Pilot claims to give you all the thrills and spills of zapping aliens plus have all the usual features you'd expect from a simulator.

Be warned, however. This is not the sort of game you get to grips with in an afternoon; the 50-page pilot's manual gives that away.

In order to keep down the body count, you are thoughtfully provided with a simulator with which to practice zipping around the cosmos. The simulator even allows you to slow things down and freeze the enemy while you walk up to him and shoot him. This thoroughly unsporting option didn't seem to work on the review copy.

Still, being unsporting and underhand is something you learn all about in this game. You have a device called a transponder which identifies you, and you to your enemy. However, interdictors have the ability to change their call sign. So the idea is to slowly move up to the unsuspecting enemy, then give him a quick blast up the rear shield. Works every time, unless that is he does it to you!



Like any simulator worth its salt, there are plenty of controls to play with and instruments to watch. You have 20 controls to play with and a dazzling array of instruments which tell you everything from the I.D. of the nearest ship to the day you last changed your underwear.

Once you think you've mastered all this in the simulator, you get on with the real thing, life and death stuff.

Having zapped all the bad guys, now you get the hard part. Between you and getting some shuteye at the local spacepost are the automatic space station defences — and boy, are these lads jumpy. Your course, speed and transponder must all be correct or it's curtains.

Deus ex Machina

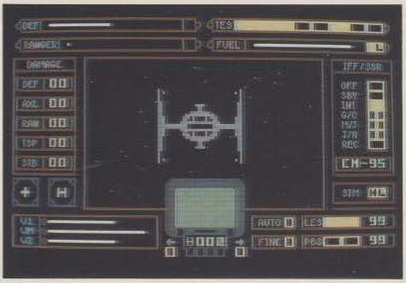
Automata
Spectrum 48K
Unique
£15.00

★ ★ ★ ★

HOW DO YOU start to review this game? With most, you say its similar to A, or an enhancement of B; but this game is just unlike anything you've seen before, there is no reference point.

The plot goes along these lines. Just before the last mouse on earth died, it climbed into this machine, and had, well, a slight accident. You must, as some kind of life force within the machine, guide this accident through to becoming some sort of life form. Weird, huh? All this is done in synchronisation with a sound track which features such luminaries as John Pertwee, Ian Dury and historian and nuclear disarmament campaigner E.P. Thompson. John Pertwee is the main narrator, and guides you through the game with a sort of space-age version of The Bard's Seven Ages of Man.

During each of these seven ages, some ill will assail your little accident as you guide it through life. How well you cope with your task is reflected in your rating which you take on with you to the next section of the game. Eventually it is hoped, you will make it to the end in some kind of shape, expressed as a percentage.



The graphics in this game are quite outstanding, considering the limitations of the machine and really add to the overall flavour of the game.

Automata have without doubt produced something which is totally original here which might just give the software industry the creative jolt it so badly needs. Non-sexist, non-racist and non-violent: it should have come with a 'G.L.C.-approved' label. No longer is it the mind-numbing business of going about slaughtering anything in our path, before it kills us, the mentality induced by many games. This game is trying to show how the computer game can be a stimulus to the imagination. I just hope they don't start interviewing computer programmers like pop stars: "Could you explain the meaning of your latest game to our viewers" stuff.

It certainly is a very enjoyable game, however, it may not be the sort of addictive game you play hour after hour.

Few computerniks will be able to resist playing God with their machine.

The best name in memor
is now also the best name on record...

You no doubt know our name for disk drives. We've spent years on research, development and marketing a range of drives second to none. A logical extension for us was to introduce diskettes. Only when we found a 5¼" double density diskette up to our stringent quality control requirements, and at a price that made sense to the end user, were we ready to put our name to it.

This is the result, a diskette of top quality, complete with a plastic protective case for the ten-pack (we also sell them individually!) together with index stickers.

Cumana diskettes are available now, as single or double sided 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name in memory . . .

CUMANA®
The best name in memory

umana Ltd., Pines Trading Estate, Broad Street,
uildford, Surrey, England. GU3 3BH.
l: Guildford (0483) 571666. Telex: 859380.

Star chart

Star Commando

Terminal Software
Amstrad CPC-464
Shoot 'em-up
£8.95

★ ★

If MAT is an example of the evolution of a game, I'm afraid I have to say that Terminal Software's Star Commando is an example of relative degeneration. The highlights of this program for me was entering a sector on which no data was available and being attacked by a bunch of giant strawberries. This is yoghourt making on the grand scale. As a conventional shoot-'em-up, it's fine.

The screen shows a head-on view of attacking aliens, together with power, score and danger level displayed in a square at the base of the screen. The long-range scan option is just a disguised way of opting for different screens and strategy does not come into it. Frankly it's hard to see how a galaxy run by giant strawberries could be any worse off than it is already.

Roland in Time

Indescomp
Amstrad CPC-464
Platform game
£8.95

★ ★

Roland In Time from sunny Spanish software house Indescomp is an Amstrad original. Sadly it's not all that original and the graphics are not as interesting as the company's implementation of Roland on the Ropes — or Fred, as he is known on the Spectrum.

A timewarp facility catapults you into different frames of a ladders-and-levels game. The frames have titles like "Roman Fort", "Njorl's Dragonboat", "Seen my Ballista?" and "West of Dome 9". You move around picking up power pills and trying not to bump into nasties.

SOFTWARE Shortlist

American Football

Argus Press Software
Spectrum 48K
Sport simulation
£9.99

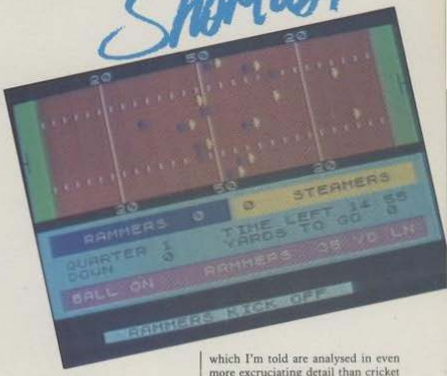
★ ★ ★

AMERICAN FOOTBALL simulations have been around almost as long as Lunar Landers and Hammurabis. Essentially, this offering from Argus Press is simply a refinement of this hoary old classic with some nice touches and pretty graphics thrown in.

The instruction book contains the basic rules for American football, along with a phrase book to explain the essential slang of the game to the ignorant Limies. Then on to the game proper with an explanation of what to do. The game can be played against the computer or by two humans. The attacker selects a play in secret and then the defender enters his play. By comparing the two, and introducing a random element, the computer works out the results of the play, whilst you watch your best quarterback getting flattened on screen.

The tactics seem to be to try and run for the first few 'downs' to see if you can make the ten yards required, and only resort to a risky pass if things look desperate. Of course, this is exactly the tactic your opponent will be expecting, so you have to spice it up with the odd unexpected pass now and then.

The screen display is very helpful, showing the pitch itself, the score, time left, yards required and 'downs' to go. There is also a help screen in case you forget the two letter code for the particular play you want, of which there are 15. After the match, you get a whole bunch of statistics, which I'm told are analysed in even more excruciating detail than cricket averages. This game may well go down well Stateside, and it is probably going to remain the best version of this old classic, but for the true English man, it may soon lose its appeal.



Countdown to Meltdown

Creative Sparks
Spectrum 48K
Arcade Adventure
Adventure
£7.95

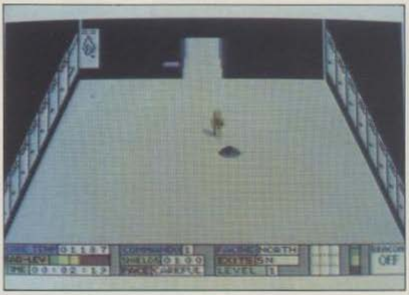
★ ★ ★ ★

SOMETHING DISTURBING has happened at the local nuclear power station, there's been a bit of an explosion and most of the human staff have been killed. However, there are still a bunch of aggressive androids hanging about trying to stop your bunch of androids from closing down the plant before you all get blasted to kingdom come.

Your job is made no easier by the fact that someone has inadvertently lost the plans so you don't know where the core room is; also the radiation level is rising all the time, which is no fun, even for an android.

A description of the scenario hardly does justice to the game. There are two thousand rooms spread over eight levels. You have eight androids, only one of which you can control at a time. Each of these androids has different abilities: strength, intelligence and so on.

These abilities govern the ease with which he can use the various bits of equipment scattered all over the place. Each android can only carry eight pieces of equipment.



The game avoids the tedious adventure game "suck it and see" approach by telling you how to use each piece of equipment; none of this "try every verb I can think of, something's gotta work" stuff that we normally have to resort to.

The graphics are excellent. Although the huge number of rooms I achieved by having a limited number of room types, this is enhanced by the "Star Trek" type doors and lifts. Some of the doors are broken and have to be fixed. This can be awkward if you've got a dumb android on your hands; the unfriendly attentions of the reactor guardians do not help either.

This is a well-designed game which will hold its appeal even after you've found the reactor. Getting all the stuff you need together is fun.

Sultan's Maze

Gem Software
Amstrad CPC-464
Maze game
£8.95

★ ★

GEM SOFTWARE'S Sultan's Maze gives you the same down the corridor view that you get in Romik's 3D Monster Maze, but has more of a myth attached to it. Apparently the Sultan of Baghdad was robbed on a visit to England. His personal champion pursued the robbers into Hampton Court maze. You have to retrieve all the jewels, steering yourself around by the numeric keypad.

A L I E N

In space no one can hear you scream.

NAVIGATOR
Shy, Skilful and Intelligent — Panics Easily.

EXECUTIVE OFFICER
Direct, Imaginative, Cautious, Loyal.

SCIENCE OFFICER
Secretive, Unlikeable, Brilliant — Occasionally Illogical.

CAPTAIN
Solid, Dependable, Courageous — Excellent Leader.

ENGINEERING OFFICER
Physically Strong, Low I.Q. Potentially Rebellious

3RD OFFICER
Wilful, Ambitious, Authoritative, Resourceful.

ENGINEERING OFFICER
Cynical, Rebellious, Untrustworthy, Unflappable.

THE CREW
Personnel files follow – yours to command – well almost.

MIND GAMES
SPECTRUM 48K · CBM64

Argus Press Software Group

Featuring the unique Personality Control System

£8.99

No. 1 Golden Square, London W1R 3AB, Telephone 01-437 0626

NEWS

oaeo
rssu
tttt
h h

The crystal ball

Coming soon from Adventure International is Spiderman, written by Scott Adams as a follow up to the successful Incredible Hulk. Like Hulk, the adventure will be text and graphics and be available for a wide range of home computers.

Scott Adams also has two others on the way — Sorcerer of Claymore Castle and Return to Pirate Island. The latter is a sequel to the earlier, and immensely popular, Pirate Adventuer.

Beyond The Infinite is the title of Digital Fantasia's latest. Expect it in your shops soon.

The Final Mission is the third part of Incentive Software's Ket trilogy for the 48K Spectrum. The earlier two were Mounains of Ket and Temple of Vran. While all three are self-contained adventures, solving all of them could win you a video recorder from Incentive in a competition to celebrate the release of the complete saga.

A helping hand

For BBC adventurers wrestling with Acornsoft's superb PHILOSOPHER'S QUEST:
Being grabbed by a sad octopus?
KNI FO ELTTOB A TI EVIG
Have you ceased to exist?
"KNIHT" TON YHW OS MA I
EROFEREHT KNIHT I

For stymied players of Adventure International's THE COUNT:

Stake keeps getting stolen when you fall asleep in the brass bed?
TESOLC YTSUD EHT NI TI KCOL
Coffin locked from the inside?
TES SAH NUS EHT RETFA TI GNINEPO YRT
HUGO NORTH

QUEST *corner*

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

The Count

BBC B
£7.95
Adventure International

ALTHOUGH THIS extremely popular adventure has been around for some time, it has only recently been converted for the BBC B microcomputer. Now owners of this micro can share in the pleasures and mind-stregching of one of the classics in the adventure genre.

Written by Scott Adams, who is something of a legend among adventure buffs, The Count sets you down in Dracula's castle, your mission being to seek out the Count and destroy him. You start the adventure in a brass bed where you have just awoken, in the afternoon, from a deep sleep. There's no point in trying to escape from the castle before you've completed the job — the local peasants will lynch you if you attempt to sneak out!

The adventure accepts the traditional verb/noun command input and the location descriptions are fairly short. But what sets the Scott Adams' adventures high above others are the tantalising puzzles and dry wit of the author. Among many bizarre objects and incidents you'll come across in The Count are a laughing bat, a bottle of blood which is delivered to the castle front door, and an unreliable flag pole.

You only have a certain time limit to accomplish the deed; watch out when the sun sets! You'll find a couple of useful hints on this testing adventure over in the Helping Hand column.

Robyn Hode

48K Spectrum
£9.95
Runesoft

NOTE THE Olde Englishe spelling — the adventure is set in the 13th century, all the place names and spelling are based on original ballads of Robyn and his Merrie Men. In fact, in order to make this adventure as authentic as possible, a great deal of research has been conducted, including reference to such historical documents as the Domesday Book and early maps.

The adventure is massive,

providing over 400 locations for you to heigh-nonney-no around. Because it is so large, the adventure comes in two parts on the single cassette, each part using all 48K of the Spectrum's memory. To get to play part two, you'll need to finish part one first — this will give you a two-part code as your password to the second half.

The vocabulary is similarly impressive — over 120 words in all — yet response is immediate. The entire program being in machine code, generated with the aid of The Quill.

The plotte: Maid Marion has been captured by the Sheryffe and held in Notyingham Castle on a charge of treason. Although it may well be a trap, Robyn decides to rescue her without the aid of his men. Can you, as the outlaw of Scherwoode Forest, outwit the Sheryffe and so save fair Marion?

If you fall, mortally wounded, Lyttle Johnne carries you to Kirklees Priory where, on your deathbed and bow in hand, you fire off a perfect final arrow through the open window before expiring. Beat that for a poetic demise! Odds Bodkins and by my troth, this is indeed a smashing adventure, highly original and beautifully put together.

Coming soon. Swords and Sorcery — supposedly the closest thing yet to Dungeons and Dragons on a micro.

Mysterious Fairground

48K Spectrum
£6.95
Buffer Micros

A QUILL-GENERATED adventure, this one has an intriguing setting. As you can gather from the title, the adventure takes place inside a strange fun fair where your objective is to recover five hidden items of treasure.

You start inside the fairground, a locked gate dashing any thought of a quick exit. A cursory trip around the nearest locations reveals a garden — I wonder if those bean plants can be watered? — a hall of mirrors, a rifle range and a ghost train.

The ghost train gives you your first major problem. Inside this ride, you experience a sense of the unnatural so shouldn't be surprised to find something unpleasant lurking there.

MEMOTECH MTX500

OVER £35·00 WORTH OF FREE SOFTWARE

The Ultimate. Only £199.

MEMOTECH MTX500 MAJOR FEATURES

STANDARD I/O PORTS

- Variable rate cassette port (up to 2400 baud)
- Two joystick ports using Atari configuration
- Centronics-type parallel printer port
- ROM cartridge port
- Uncommitted parallel input/output port
- Internal ROM board port
- Hi-Fi output port
- 4-channel sound through TV speaker
- PAL composite video colour Monitor port

THE RS232 COMMUNICATIONS BOARD

(required for disc expansions)

- Two independent RS232 ports
- 60-way Disc Drive Bus supporting up to four 5.25 and/or 8 inch floppy disc drives, plus instant access Memotech Silicon Discs, and Hard Discs with capacities up to 32 Megabytes

USER RAM

- Optionally expandable to 512K in increments of 64, 128, or 256K

24K OF ROM which includes:

- MTX BASIC
- Noddy, a simple, text-handling language
- A powerful Assembler/Dissassembler – sections of machine code can be created and run by calling the Assembler from within BASIC
- The sophisticated Front Panel, which displays the contents of all registers (including the F flag register) and pointers during program execution
- All four languages can be used interactively with each other, and with the user

ROM EXPANSIONS

- MTX NewWord, a 32K word processing package
- Hisoft PASCAL, written specially for the MTX Series

THE KEYBOARD

- Full size, 79-key, full-stroke professional quality keyboard incorporating:
- Main Block with typewriter-style layout
- A separate 12-key numeric/editor keypad
- Eight programmable function keys (16 with shift)

HI-RES GRAPHICS MODE

- 256 × 192 pixel resolution plus
- 32 × 24 Text in 16 foreground and background colours
- All 16 colours (i.e. 15 colours plus transparent) are available on the screen together
- 32 user-definable easily controllable sprites
- 128 separate GENPAT statements providing a huge range of user-defined characters

TEXT MODE

- Text resolution is 40 × 24 characters plus
- 128 user-defined characters
- Eight user-definable virtual screens or "windows" (available in all modes)

For further information, please contact:

MEMOTECH

MEMOTECH LIMITED STATION LANE INDUSTRIAL ESTATE WITNEY OXON OX8 6BX
TELEPHONE: (0993) 2977 TELEX: 83372 MEMTEC G

Paul Bond wallows in nostalgia as the last Vic is rolled out of the hangar

VIC GAMES

THE NEWS THAT Commodore is to cease manufacturing the Vic-20 must have brought a nostalgic tear to the eye of many a home computer owner. It is rather like the roll-out of the last DC-3 aircraft, or the final German-built Volkswagen Beetle. It seems incredible that Commodore has already manufactured a million computers in their recently-opened Corby facility — but the company will be rolling machines off the production line at the rate of one every 2.5 seconds when up to strength. Sadly, the Vic will not be part of this great future — tomorrow belongs to the C-16.

This has not deterred the company's software arm from releasing more new software for what must be one of the world's most ubiquitous computers.

Bomber Mission, for the Vic-20 plus 16K expansion is a compact flight simulator, supposedly putting you in the pilot seat of a World War Two fighter-bomber. First, select your target — it could be anything from an armoured column to a submarine pen or a power station — then pick your weapon system: tall boys, fragmentation bombs, blockbusters.

The computer then puts up the cockpit display. It's a fly-by-instrument job, even with the extra 16K the Vic is not up to giving you much of a view out of the window, until enemy fighters turn up.

These judder about the screen in best Vic-20 rough-scrolling graphic fashion giving you an opportunity to use up your ammunition.

Over the target the bombs are automatically armed. You press the fire button and a message appears telling you the result.

You then have to turn to bearing 0 to fly home, and be sure to lower wheels and flaps above 1,000 feet and get speed in the area of 120-150 knots. I was destroyed quite a few times by pre-emptive strikes on the runway — the trickiest thing in this simulation is getting your plane off the ground before you're blown up. Each mission has a time limit and you must land before it ends. As a last gasp for the Vic-20, this program is quite an achievement — but it will bring a wry smile to the faces of Spectrum fighter jocks.

At the other end of the scale from quality software produced on behalf of the manufacturing company to ensure old hardware stocks keep moving we find the licensing trend. This is where a software house decides to let someone else have the bother of selling a line which has been around for a while.

This is good news for Vic-20 owners in the case of Omega Software — "the last word in software" — because they're doing a Mastertronics and selling everything for 1.99. Omega was the last word in Vic-20 software for Anirog, it would appear, since all the Omega games looked at for this review hail orginally from that house.

Omega's Gunslinger is, in fact, Anirog's High Noon — a four-cactus scenario where you steer your cowboy around the screen, using a joystick and 16K expansion. You are better off playing the game with another human since the micro takes a sadistic delight in shooting you dead immediately the game starts, just so it can play the funeral march. The theme music is Mungo Jerry's "In the Summertime", which should appeal to devotees of '60s novelty hits.

Battle Ground is like Space Invaders tipped on its side. Imperial walkers move toward the right-hand side of the screen which you defend by moving behind your bases and shooting or zipping out and laying barriers in their path to delay them.

Game	Company	Price
Bomber Mission	Commodore	£4.99
Gunslinger	Omega	£1.99
Battle Ground	Omega	£1.99
Space Pirate	Omega	£1.99
Bricks	Palace	£5.99
Squish	Palace	£5.99
Dodo Lair	Software Projects	£5.95
Perils of Willy	Software Projects	£5.95

Space Pirate, which needs 16K expansion, is set in a space shooting gallery presented in perspective. The targets emerge from a box in the upper centre of the screen and weave about frustrating your attempts to put the cross-hairs square-on and blast them to smithereens. The explosions are very good, I must say. The second level includes indestructible ships which collect the target ships, reducing your score. A neat little shoot-'em-up, good value at this bargain price.

Palace Software presents us with two "exciting and frustrating" arcade-style games for unexpanded Vic-20s, excitingly and frustratingly titled Bricks and Squish.

Squish is a shove-things-around-and-squash-icky-things game. The graphics are pure Vic-20 primitive, which is all you can expect given unadorned onboard memory. Little purple scorpion-like creatures menace the protagonist who runs about waving his arms and making the sort of footstep noises you hear between tracks on avant-garde rock albums. Twenty levels and watch out for the bug bullets.

Bricks I found more frustrating than exciting. You are at the bottom of the screen. Bricks rain down. You dodge them. The idea is to climb up using the fire button until you reach the top of the screen. You can jump up only one brick at a time, but jump down any number of bricks.

Perils of Willy, also from Software Projects, but with 16K more of elbow room is more impressive graphically. The cassette inlay tells us you are a little the worse for alcohol and you must stagger home, catching the notes of music that hang in the air. The loading screen puts up the tell-tale "Miner". It is in fact a ladders-and-levels game, with lots of jumping on to platforms, sliding along conveyor belts, and being eaten by dogs. The game is a dire warning to people who insist on seeking out the Pub of the Year in Richmond, rather than just going to their local.

Punchy from Mr Micro runs on a Vic-20 with 16K. You must guide Bobby the policeman through various obstacles to rescue Judy from where Punch has imprisoned her.

This includes jumping over spiders on the flat, catching a magic carpet across the sea, and hopping along a castellated rampart. Have you ever castellated a rampart, missus? Enough of this alternative humour. I was a little spoilt by having seen this on the CPC-464, flicker-free graphics, smooth-scrolling etc., and frankly I had a hard time figuring out what some of the things were supposed to be on a Vic. Punch could have been the Honourable John Selwyn Gummer for all I knew.

A brave try, but you know what they say about the limitations of the machine. Well, here I am, saying it again. ■

A New Leader Emerges

Protek Switchable Joystick Interface

It is so easy to use–there's no software patch tapes or programming required. Simply plug in and flick the switch for compatability with all games requiring a joystick.

Available for immediate delivery, retailing at £19.95.

Protek

Protek Computing Ltd, 1A Young Square, Brucefield Industrial Park, Livingston, West Lothian. 0506 415353.

Paul Bond meets some old friends in new surroundings

AMSTRAD GAMES

IT'S EARLY DAYS yet, but it's clear that not only do you get a monitor for your money when you buy an Amstrad CPC-464. You also get a rapidly-expanding software base.

"Software houses tend to take promises of hardware availability with a pinch of salt," said Amsoft boss William Pole when I asked him how the CPC-464 managed to attract all this interest. "We've had Amstrad machines out at software houses since last December."

A lot of the Amstrad software consists of old Spectrum favourites re-implemented for the 464. That doesn't worry Amsoft — "We just wanted plenty of software to be around when the machine came out."

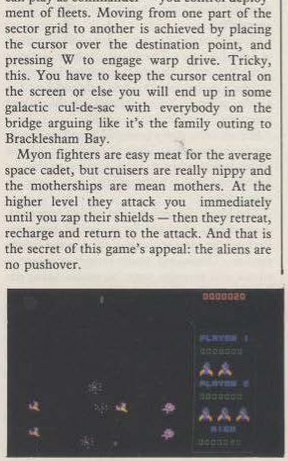
Re-implementation of Spectrum software makes sense — both machines share the Z-80 CPU; software houses' fancies may also have been tickled by similarities in specification which the Amstrad shares with MSX. Another factor which Amstrad has in common with MSX is that both will appeal to that lost generation that wouldn't have been seen dead fooling around with rubber-mat keyboards, tape recorder level controls, dodgy cables and awkward power-packs.

Yes, it's true. The built-in cassette recorder loads first time, every time — at least it did while I was looking at software for this review. One of the best games to find its way onto the 464 from its Spectrum spawning ground is Derek Brewster's Codename MAT — acronym for Mission Alien Termination as many devoted vidkids will know.

Tracing its heritage from the old grandaddy of computer games, Star Trek, via Atari Star Raiders, the game finds you in command of the *USS Centurion.* You can call up a long range scan, a solar chart and a sector scan showing a 10 by 7 grid. This galactic A-Z shows you where our boys are and what planet or satellite the evil Myons are encroaching on.

The game has two main options: you can play as pilot with deployment of Earth defence fleets under computer control: or you can play as commander — you control deployment of fleets. Moving from one part of the sector grid to another is achieved by placing the cursor over the destination point, and pressing W to engage warp drive. Tricky, this. You have to keep the cursor central on the screen or else you will end up in some galactic cul-de-sac with everybody on the bridge arguing like it's the family outing to Bracklesham Bay.

Myon fighters are easy meat for the average space cadet, but cruisers are really nippy and the motherships are mean mothers. At the higher level they attack you immediately until you zap their shields — then they retreat, recharge and return to the attack. And that is the secret of this game's appeal: the aliens are no pushover.



Strategy definitely comes into Master Chess, implemented for Amsoft by Mikro-Gen. While I doubt that this game could play those Russian boys out of town like Bobby Fischer does in the Prefab Sprout song, it is nevertheless an excellent tutor.

The screen displays the chessboard and pieces together with the current level of play on the right-hand side and a history of the 13 most recent pairs of moves for reference on the left-hand side. This scrolls upward as you play. There are 10 levels of play, numbered 0-9.

Game	Company	Price
Codename MAT	Micromega	£8.95
Master Chess	Mikro-Gen	£8.95
Monster Maze	Romik	£8.95
Atom Smasher	Romik	£8.95
Alien Break-In	Romik	£8.95
Galactic Plague	Indescomp	£8.95
Electro Freddie	Sosoft	£8.95
Gems of Stradus	Kuma	£7.95

(All except Kuma programs available from Amsoft)

An opening book of 6,000 moves is includes in the program; apparently the program can look ahead as far as 27 moves on certain opening gambits. Looking ahead is a good thing to do in a maze filled with monsters — like in Romik's 3D Monster Maze. The game which won such rapturous acclaim when introduced on the good old ZX-81 is beginning to look a little tired now on the Amstrad, as are most of the Romik retreads like Atom Smasher and Alien Break-In. Nevertheless, the latter is probably one of the best straight shoot-'em-ups around; I have even heard afficionados speak of the BBC implementation in the same breath as Zalaga — praise indeed.

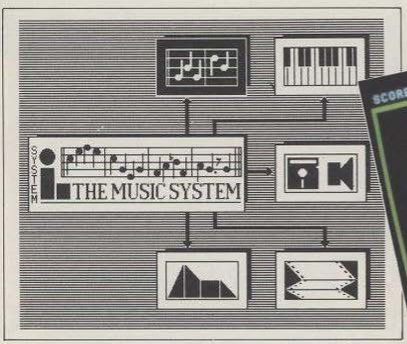
Paco Suarez, one half of Indescomp's indefatigable Paco and Paco who produced the graphically excellent Bugaboo for the Spectrum, has however created a stunning Space Invaders variant for the CPC-464. In Galactic Plague, everything happens so quickly that one is tempted to start doing Neil impressions — "What's happening, man?"

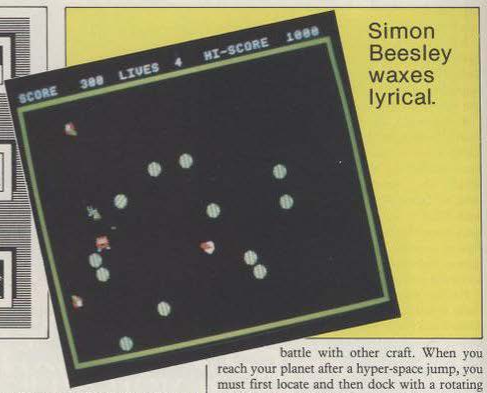
Brightly coloured space fighters zoom across the screen dropping bombs in a diagonal criss-cross wave pattern. The game seems almost unplayable, but as various strategies are developed by the player it looks possible to survive long enough to score at least 300. Wow-ee.

Your Computer has already reviewed Sosoft's Electro Freddie (Software Shortlist, October) and Kuma's Gems of Stradus (Software Shortlist, September). Protek's Hunter Killer submarine game written by Rod Hopkins in fact made its debut in Spectrum format in the August 1983 edition of *Your Computer.* Some 50 titles are scheduled for release in the next three of four months, 20 of which will appear on the Amsoft label. Level 9 are implementing most of their adventure titles for the 464 and Ultimate Play The Game were one of the first companies to get an Amstrad. The next wave of releases will include some very brainy stuff, like a sound designer and also a screen designer. The latter is from DJL, famous for Ms Pac-Man, and is described as "the Rolls-Royce of screen designers." Tasword and languages like Abersoft Forth will also arrive in time, making the Amstrad a very respectable machine indeed.

The clincher is the release of the Hitachi three-inch add-on disc drive. For less than £200 your get access to 180K of memory on each side of a disc. This and the capacity to run CP/M 2.2 will appeal to the "serious user", whoever he is. For the games player — well, average cassette loading time is about eight minutes. Discs promise eight seconds. ■

BBC SOFTWARE





Simon Beesley waxes lyrical.

SOME PEOPLE ARGUE that BBC games over the last year have not generally improved on the standard set by Acornsoft's first releases — Snapper and Planetoids. It has also been suggested that the supply of new software is about to dry up. But in fact, far from being on the wane, BBC software is definitely thriving.

In particular the space epic, Elite, marks Acornsoft's return to form. This is a blockbuster of a program which combines elements of Star Trek games, flight simulators, and trader games. It also has points in common with Atari's Star Raiders — the game deemed by Jeff Minter and the editor of *Practical Computing* to be the greatest ever written.

The aim in Elite is to roam the galaxy as commander of a spaceship and by a mixture of trading and combat improve your status from "harmless" to "elite". In the trading stage you need first to choose a suitable planet.

Long and short range charts show the options while entering Status mode gives such detailed information as the nature of a planet's inhabitants, its form of government, and technological level.

Getting to a new planet, however, plunges the player into arcade action. On the way you battle with other craft. When you reach your planet after a hyper-space jump, you must first locate and then dock with a rotating Coriolis space station — a difficult feat of manoeuvering.

In the action sequences the screen manages to combine a view of space in Mode 4 high resolution with a console display below in Mode 5 colour. Planets, space stations, and other ships are shown in motion in 3D complete with hidden line removal.

This description barely conveys the scope and complexity of the game. Acornsoft is organising a monthly competition around it. Players who want to join the Order of Elite will have to study the 61-page training manual thoroughly and then notch up hours of flight experience.

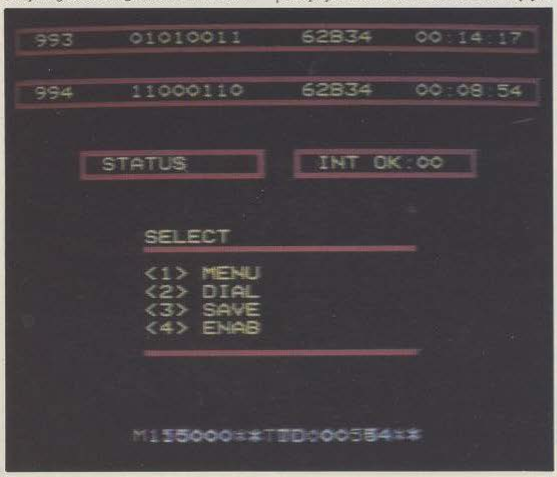
Good though Elite is it has to yield first place to Island Logic's The Music System — not a game but easily the most impressive piece of software in this month's batch. Island Logic is a new software house formed by the record company Island Records.

For almost a year a team of 12 has been working on the program. The end result is a package which makes other music programs on this, or indeed any other home micro, look crude by comparison.

The Music System consists of five programs, or modules, managed by a control program. Perhaps the most striking of these is the Editor module. Displaying some superb graphics it allows you to write notes on staves using the full range of musical notation.

Island Logic rightly describes it as the musician's equivalent of a word processor. Up to 860 notes can be entered in any one of four voices. Each note can be assigned volume and one of 15 envelopes. You can also set the tempo, transpose the key, and mark the bars automatically. Changing a note is simply a matter of pressing a cursor key to shove it up or down the stave.

When you have composed your piece you



can play it back and watch the notes scroll across the screen. Alternatively you could use the Linker module to combine it with another composition or load in a backing track.

There is a Library disc which contains a large number of predefined envelopes, rhythm tracks, and sample compositions. For a vivid demonstration of the Editor's power load in Bumble Boogie, a jazzed up version of the Flight of the Bumble Bee. Up the tempo and you can enjoy the spectacle of notes bouncing up and down the stave at a rate of 200 beats per minute.

To create new sounds there is a Synthesiser module which displays graphs of the volume and tone envelopes. In the Keyboard module you have a superior version of Quicksilva's Muproc: it lets you lay down four tracks using the Qwerty keys which it displays as a piano keyboard.

Both these features are common enough, although not usually so well implemented. Quite a new feature is the Printer module. With this you can create a four-part musical manuscript by dumping it to the printer in either high or low resolution.

Apart from its range of facilities what lifts TMS out of the ordinary is the ease with which it can be used. The entire system is driven by menus together with Macintosh-like icons. And it even includes message windows which paste over the display.

Perhaps the best tribute one can pay to TMS is that it is probably the first program that would not draw scorn from practising musicians — providing, of course, that they were not put off by the rather tinny quality of the BBC's sound.

Back on the games front, there is Acornsoft's Tetrapods, a much simpler game than Elite but in its own way just as addictive. You control an Asteroids-style triangular ship. Scattered around are numerous pods, which resemble peppermint lozenges, and a couple of Killer Bees. In later screens the bees are assisted by the more vicious Red Devils and Poison Orbs.

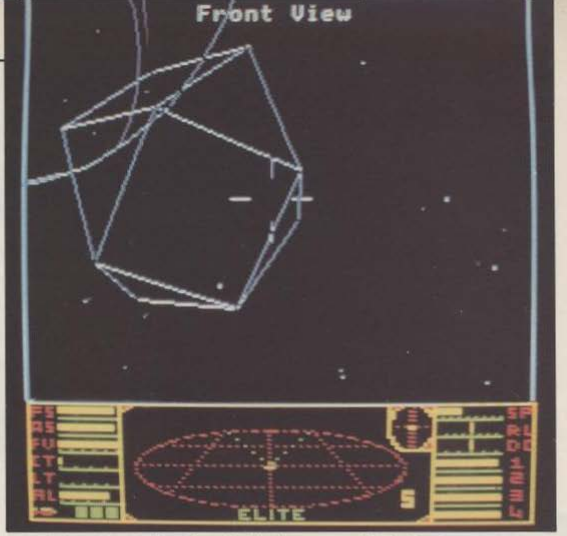
It is possible to shoot some of these creatures but more satisfying is to enlist the aid of lizards. These are what hatch out when you hit a pod. Like heat-seeking missiles they are relentless in pursuit of the nearest life-form.

To complicate matters the scene is one of constant motion with bullets bouncing off the sides, pods behaving like billiard balls, and wriggling lizards tracking their prey. It is like looking at a cell colony under a microscope.

By contrast Acornsoft's other two releases are disappointing. Drogna is a two player board game which first appeared on the TV series *Adventure Game*. Although a fun game which calls for a high level of skill, it is only marginally enhanced by being translated to the computer screen. What is needed is a one player option against the computer.

Volcano requires you to pilot a helicopter across Mount Crona, avoiding an eruption of blue rocks. On the other side are some humans who need to be carried back to safety. The graphics here are lacklustre and, while the game is challenging, it lacks variety. Acornsoft would have done better to have attempted a version of the definitive helicopter game, Choplifter.

If there is already a great game on another machine, converting it to the BBC often



succeeds better than striving for originality. Atarisoft has made a good job of translating its classic game, Pole Position.

Most of the original features are here. You are competing in the Atari Grand Prix against a dozen or so other racing cars. Crash into them and you burst into flames. Take to the verge if you like but it slows you down and you risk hitting a hoarding.

These and other effects such as gear changes and the mountain backdrop, which scrolls when you corner, are convincingly rendered. The all-important engine sounds are not quite as satisfying as they are on the original. The BBC can't reproduce the deep throaty roar of the Atari cars. And the scrolling is not as smooth. Nonetheless this is the best race-track game available for the BBC.

Converting a platform game to the BBC is not quite so easy. An essential feature of the genre is that there should be numerous different screens. But on the BBC there is not enough memory to store a great variety of screen layouts.

Durell's Manic Miner-type game, Mineshaft, gets round the problem by stripping away such extraneous details as zany flying objects, and concentrating on sheer tortuousness. The cast of hostile objects is small and many of the screens use the same conveyor belts or crumbling floors. But to make a successful jump your timing has to be of split-second accuracy, while finding the correct route is even more critical than usual.

To prove the point, one of the 20 screens — entitled The Resting Place — does without any moving obstacles. You have simply got to travel from A to B — a bit like trying to find a foothold on the North Face of the Eiger. It is a relief to discover you can move on to the next level by pressing Escape.

Needless to say this level of difficulty is just what the platform enthusiast looks for. Together with a restful soundtrack — a rendition of *Greensleeves* — and smooth animation it makes Mineshift superior to such rival games as Blagger and Ghouls.

Would-be hackers can serve their apprenticeship on System 15000. A hacker, of course, is someone like the teenage hero of the film, *War Games*, who uses a modem and the telephone system to break into computer databases.

System 15000 is the name of the simulated communications system which this game puts at your disposal. Apparently your friend Richard's company Comdata has been ripped off to the tune of $1,500,000. He wants you to save the company by breaking into a chain of computer databases.

Throughout, the game provides a convincing simulation of the hacker's task. On screen it gives a typical viewdata display. It maintains the realism by producing a telephone sound.

At the start you are supplied with the telephone number and code of a single database. By viewing this you gain leads which allow you access to others. Each may contain information about names and associated codes or vital financial and company data.

In all there are 16 databases to crack and as many red herrings along the way. Expert hackers might possibly solve the problem in one day-long sitting but it is more likely to take weeks or months. In this respect the program is like an adventure game. But otherwise System 15000 is that rare phenomenon — a genuinely novel game. ■

The Music System	Island Logic	£24.95 (disc)
Elite	Acornsoft	£14.95 £17.95 (disc)
Drogna	Acornsoft	£9.95 £11.95 (disc)
Tetrapods	Acornsoft	£9.95 £11.95 (disc)
Volcano	Acornsoft	£9.95 £11.95 (disc)
Mineshaft	Durrell	£5.95
System 15000	AVS	£12.95
Pole Position	Atarisoft	£9.99

MSX REVIEW

MSX MUST HAVE seemed like a good idea at the time. Good for the user, who could be sure of buying a stable machine, with what was likely to prove a huge range of games and other software. Good for the manufacturer, who could avoid going out on any draughty and lonely limbs, and save on costs by sticking to components that were in plentiful and cheap supply.

But there is one tiny problem. For the whole idea of MSX to work, you have to impose fairly strict rules of what an MSX computer must and must not have. This means that all MSX machines are much of a muchness. They all run the same Basic from Microsoft, have a Z-80A processor, and use similar sound and graphics chips. So when it comes to buying a particular model, you have to choose between very similar machines.

The four micros reviewed here — three "official" Japanese MSXers, and one interloper from Korea — show the different ways manufacturers have tried to make their machine stand out from the crowd. The most obvious way is the packaging. Although every machine has the same keyboard, including special keys like Graph, Select and Code, and a cartridge slot, joystick ports and various video outputs, where you put them on your plastic box is up to you. And you certainly have plenty of room. MSX machines seem so far to have pretty greedy footprints.

One of the tell-tale signs of an MSXer is its cluster of cursor keys, set to the right of the keyboard. Sony's Hit Bit Uses four trapeziums — or is that trapezia? — arranged in a square. These are nice and large but very shallow, so you feel curiously unsatisfied when you hit them.

The Mitsubishi ML-F80 uses a similar plan, but squashes the left and right cursor. They do, however, have deeper travels. For my money, the Canon V-20 wins the day in this department. Rather daringly, it uses bold large rectangles, two large ones for up and down, and two smaller for left and right. Again, they are rather shallow, but their shape somehow compensates for this.

In fact Canon has played it big and bold throughout its machine. The five function keys doubling up to 10 with the Shift key that the MSX scheme of things demands, extend right the way across the top of the keyboard. In programming this is really useful. For example in MSX Basic, F4 is programmed as List and F5 Run. With such big targets it is easy to flick a nonchalant finger in their general direction and obtain the desired result.

The other machines all tuck the function keys away to the left-hand side of the keyboard, and use skinny little strips for keys. In-depth discussions of the width of function keys may seem completely over the top, but differences between MSX machines do really come down to this level. Most people pay far too little attention to the keyboard. After all, this is where you actually get that hands-on experience. Normally you don't have any choice. If you want the Spectrum you just have to put up with those funny rubber keys. But with the MSX range, the feel and layout of the keyboard could well be the deciding factor between machines.

MSX keyboards have much more than just the standard QWERTY keys. Most keys can generate three or four different characters when used with the Shift key, Graph key, Graph and Shift key, Code key and Code and Shift key. There is a special foreign accents key just for sticking on umlauts and circumflexes.

Other unusual keys on all machines include

AUTUMN COLLE

Blacks and greys are the MSX colours for this autumn. But can our man on the catwalk, Glyn Moody, tell the difference between the Canon, Mitsubishi or Sony styles and the £230 Goldstar's coarser cut?

CTION

such things as square and curly brackets, pound signs and Spanish tilde signs. One effect of this generosity is that Return and Back Space keys are slightly too far away if you are trying to touch-type with your hands stationary on the keyboard.

The Canon scores again in choosing to put the accents key mentioned above to the right of the right-hand Shift key. It is therefore much harder to press Return be mistake — only too easy on the other machines.

All of the MSX machines have TV, video and audio outputs, cassette port, MSX printer port, two joystick ports and a second cartridge slot which can function as an expansion bus. Ports and on/off switches are all over the place on different machines, but there are no startling innovations.

The cartridge sockets are generally in the top right-hand corner of the machine — except for that individualist Canon, who puts it in the top left-hand corner. This may well be more convenient for right-handed games players who wish to flip in mid-stream from one zapping cartridge to another without ever loosening their fevered grip on the joystick.

Moving on to the software, one way of adding something to a machine's appeal is to stick in a few ROMs' worth of software. This will leave the basic structure of the machine ntact, and preserve the MSX format. Sony as followed this path with its Personal Data ank.

On powering up the Hit Bit, you are given a ort menu of choices. One of these takes you aight to Basic. The others let you use an dress book and memo pad program which held in ROM. These are not very histicated, but you can store about 50

(continued on page 65)

GET SET FOR ACTION

Protek Joysticks and Joystick Interfaces give you arcade-quality on the ZX SPECTRUM, BBC MODEL 'B', ORIC ATMOS & ELECTRON COMPUTERS. The perfect Christmas gift for the computer buff.

GIFT SETS INCLUDE:—
BBC MODEL 'B' GIFT SET
INCLUDES
- Quickshot I Joystick
- Protek BBC Interface

£19.95

ZX SPECTRUM—
GIFT SET
INCLUDES
- Quickshot I Joystick
- Protek Switchable Joystick Interface and a Free Games Cassette

£24.95

ZX SPECTRUM "SWITCHABLE INTERFACE" £19.95

A new Joystick Interface that's compatible with all Joystick controllable software. There's no programming or software patch tapes required. Just flick the switch to select the system you require.

ORIC ATMOS 48K PROGRAMMABLE
£29.95

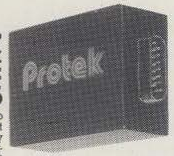
Now you can use any 'ATARI-TYPE' Joystick including Quickshot II Joystick to control your arcade software. You can select up to nine keyboard functions and programme these into your Interface. No software tapes or patch programmes required.

ELECTRON PROGRAMMABLE JOYSTICK INTERFACE (Available November)

Now you can use any 'ATARI-TYPE' Joystick including Joystick II to control your arcade software. You can select up to nine keyboard functions and programme these into your interface. No software tapes or patch programme required.

BBC MODEL 'B' JOYSTICK INTERFACE
£11.95

Just plug this Interface into your 'ANALOGUE-IN' port and you can now use any standard 'ATARI-TYPE' Joystick including Quickshot II Joystick.



Protek

VISA

Protek Computing Ltd, 1A Young Square,
Brucefield Industrial Park, Livingston, West Lothian. 0506 415353. Telex No. 727559

(continued from page 63)

names with up to 80 characters' worth of information in the address and telephone book. You can then search through them either by name or number or address. Lists of addresses can be saved to tape or cartridge.

If these first programs are a little unimpressive, they at least hint at possible directions in which MSX micros may develop. In an effort to woo buyers to particular machines, manufacturers will probably be forced to offer more and more glamorous ROM extras.

The MSX Basic itself, of course, is sacrosanct. So there can be no tampering here to tweak its performance or facilities. But to be fair, that is not really necessary anyway. Microsoft has done a good job in providing a powerful and clean Basic. Some of the commands were discussed in detail in the Toshiba review in the September issue of *Your Computer*. Everything you would expect from a reasonably structured Basic is there, along with powerful sound, graphics and sprite commands. Out of a nominal 64K RAM, you are left with only 28,815 bytes program area. Editing is carried out simply and efficiently using the cursor, insert and delete keys.

Text and graphics modes are entered using the Screen command. The default value is Screen 0, which allows 40 columns and 20 rows. Three rows at the bottom are given over to the function key labels. These automatically switch when you press the Shift key to flip from F1-F5 to F6-F10. Screen 1 gives you 32 columns. Screen 2, the high-resolution graphics mode allows 256 by 192 pixels. Screen 3 is the low resolution mode, with 64 by 48 coarse pixel elements. The image is stable and the colours reasonable.

16 colours are available, but in the high-res mode there are restrictions as to how foreground colours may be assigned to individual bits. Another problem is that text may not be mixed directly with graphics. Graphics commands include plotting, line, circle and box drawing, area filling, and sprite commands. Up to 32 sprites can be handled at once.

Two types of sound commands are included, both of which use the TV speaker. The Sound command itself allows you to specify 13 parameters defining channels, loudness, pitch and envelope. A more civilised command is Play, which lets you input letters such as A, C, E, which are interpreted as the appropriate musical notes of that name. Altogether there are three musical channels,

and also a simple Beep command.

Other features of the Basic include a Def Fn which allows you to define additional functions, and useful programming aids like Tron which turns the program trace on, and error-trapping routines like and Erl and Err, giving the error code and the line which generated it respectively. There is also a real-time clock accessed via the variable Time.

Running a series of standard Basic benchmarks is instructive. In ordinary loops and Gotos, the MSX machines emerged as about half as fast as the BBC, and twice as fast as the Spectrum. But in one speed checks designed to test the maths routines — such as calculating sines, logs and so on — the MSX micros were markedly slower. This is mostly due to the fact that they work to 14-digit precision. This is hot stuff for a home micro, but the penalty you pay is loss of speed in intensive number-crunching activities. For games this should be no problem.

After manufacturers have done their utmost in hardware and software to make their MSX micro into an MSXtra micro, they have only one weapon left: the price. And this is where it gets interesting for you.

Since, in functional terms, there is very little to choose between the various machines, it would be perfectly reasonable to buy purely on the basis of price. Therefore, you would expect manufacturers to be locked in a life-or-death price war. Which rather goes against the spirit of gentlemanly co-operation that lies at the heart of MSX.

Alternatively, the manufacturers could come to an equally gentlemanly agreement to keep there prices roughly comparable, so that there were no gross differentials, and also to keep them profitably high. At the moment, this appears to be what is happening. Both the Sony Hit Bit and Mitsubishi ML-F80 weigh in at a hefty £299.95. The Canon breaks ranks slightly with a price tag of £279.95. These are all 64K machines. Although MSX allows for smaller RAM sizes down to 16K, manufacturers seem sensibly to be pushing the top of the range versions in this country.

This kind of tacit agreement works fine while everyone sticks to it. The danger is that some outsider will come in and use the very strenght of MSX against itself. That is, it will produce a totally MSX compatible machine, but for half the price, say. Since there will be functionally little difference between the top and bottom of the market, the intruder stands to clean up.

There are signs of this already in the Korean MSX machine reviewed here, the Goldstar FC-200. In all important respects this is identical to the honest-to-God Japanese models — except that it is £70 cheaper. True, the whole machine does look a bit like a Mickey Mouse toy version, with garish red, green and blue keys. But on powering up, the differences prove only skin deep.

Unfortunately for the Japanese manufacturers, their bright peripherals will be no help either. Sony has produced a stylish but rather unwieldy plotter costing £250, a 320K disc drive for a steep £350, and various joysticks, including an infrared one for £65. Apart from being hideously expensive, the disc drive is also rather badly designed. For reasons of cooling, presumably, the entire case is perforated with large holes — just asking for coffee or other sticky liquids to be poured in. The other manufacturers will no doubt follow suit in announcing add-ons when the machines are released over the next few months.

Peripheral MSX appeal

But again the complete compatibility of MSX means that you can use any manufacturer's equipment with another's. So once you have bought your cheap but workable MSX micro, you can then pick and choose similarly amongst the peripherals. For once, it looks as if things could be going the user's way.

Whether the whole MSX philosophy is going to result in an MSXplosion is another matter. Personally, I think that the U.K. market will prove hard to breach, largely because of local aberrations like Sinclair, and the strong Commodore following here. The new Commodore Plus 4 in particular seems to offer practically everything that an MSX micro does, but with a neater design and useful bundled software. The Amstrad, too, will be a strong rival.

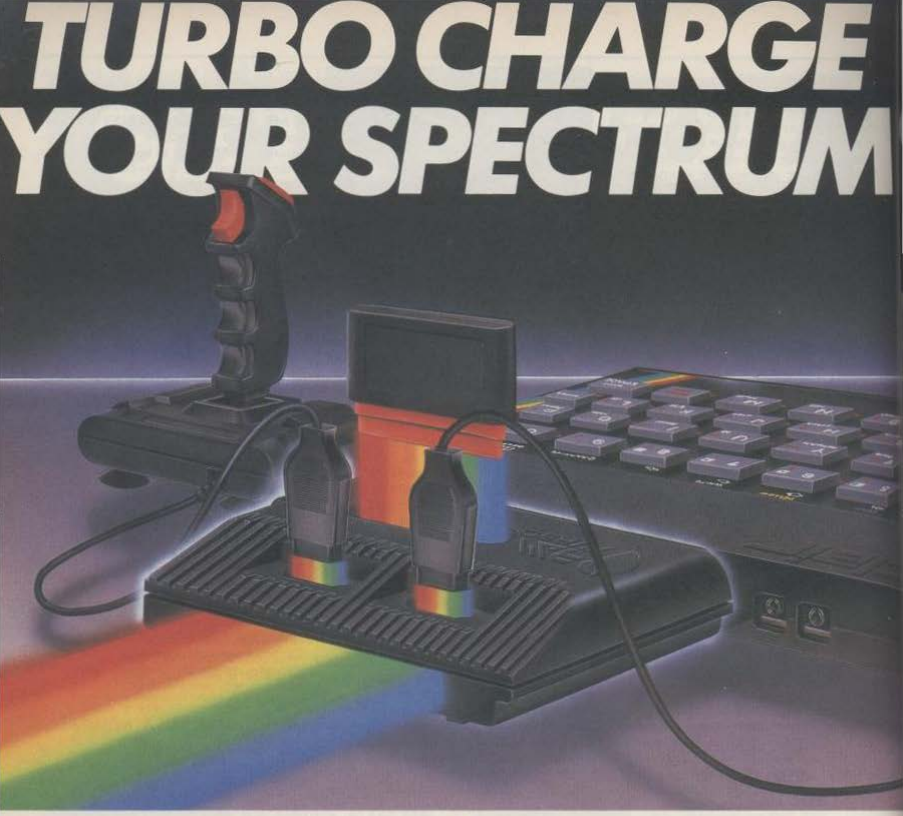
But there can be little doubt that the machines will sell, and that huge numbers of games will be written for them. It could be though, that a plateau will eventually be reached where every last drop has been squeezed out of the Z-80 that lies at the heart of the MSX philosophy. It is not clear where MSX will go after this first wave of machines.

Certainly, we can expect — one day — much more exciting games on something like the QL. As ever, it really is a question of paying your money and taking your choice. ■

CONCLUSIONS

- MSX is here, and here to stay. The concept will prove more relevant to the first-time buyer than to the hardened games addict or machine-code programmer.
- The machines are sensibly designed, and have an especially good Basic. The standard of construction seems high.
- When it comes to buying an MSX machine, there are two things to remember. First, that prices are almost bound to come down dramatically from their present high levels. So wait if you can. Secondly, if you really must be the first on your street with one of these dark gleaming machines, make sure you try out as many as possible, especially the keyboards.
- As time goes on, it is also likely that manufacturers will offer an increasing number of "added-value" features. Again, check these out thoroughly before deciding.

TURBO CHARGE YOUR SPECTRUM



Outperforms any Spectrum interface

The unique Turbo interface from Ram gives you all these features – and more – in one unit:

- A variety of interfaces including: Rom cartridges, two 9-way D plugs for standard joysticks, PLUS full expansion bus at rear.
- Compatible with Kempston and Protek protocols.
- Works with latest Quickshot Mk II auto rapid-fire joysticks!
- Choice of Rom cartridge or tape cassette software.
- Instant program loading with cartridge software.
- Built-in power safety device – unique to Ram Turbo.
- Full one year guarantee.
- Immediate availability – 24 Hr despatch on receipt of P.O./credit card details (cheques – seven days).
- Incredible value – only £22.95.

So don't wait around – simply complete the coupon and send it to us today.

Or call our credit card hot line on 02514 25252. (Access and Visa welcome).

Ram Electronics (Fleet) Ltd, 106 Fleet Road, Fleet, Hampshire GU13 8PA.

24 Hr despatch for credit cards and postal orders

Please send me:

_____ Spectrum Turbo Interface(s) at £22.95 + £1 p+p (overseas orders £3 p+p)

_____ Quickshot II Joystick(s) at £9.95 (Only when purchased with Turbo – normally £12.95 + £1 p+p)

I enclose cheque/postal order or charge my Access/Visa for: £_____

VISA

Name_____

Address_____

YC/11/84

_____ Tel_____

To: Ram Electronics (Fleet) Ltd, 106 Fleet Road, Fleet, Hampshire GU13 8PA.

RAM TURBO

Trade and export enquiries welcome.

BARGAIN BUYS — UP TO £50

These machines have been around for some time now, are about to disappear from the market and are available at very competitive prices. They are worth considering as basic entry machines to see what computing is all about.

COMPUTER	Hardware	Operating System/Basic	Software	Accessories
ZX-81 Sinclair £30	Black and white only. Touch sensitive membrane keyboard is barely adequate but this is the cheapest computer. 1K RAM. An ageing design.	Good editor with syntax checked keyboard data entry. Basic is very slow. Chunky graphics and no sound.	Lots and lots of very good cheap software considering the machines limitations.	Keyboards, joysticks, printers, lots of choice, relatively cheap. Good books. Add on memory.
MC-10 Tandy £50	Colour with chunky graphics — no user defined graphics. Sound through TV speaker. ¾ size keyboard — moving hard plastic keys with space bar.	Keyword or typed in full entry. Microsoft Basic.	There are games, not many and adequate is about the right description.	TP10 printer, also very cheap. Add on memory 16K.
SORD M5 Computer Games Ltd £50	Colour and Sprites. The MSX chip set coupled to the worst keyboard of the three colour computers. 4K 3 channel sound.	The best operating system software for a m/c Z80 programmer, access to everything. Pity about original price and keyboard. Basic is a bit weak.	Very little software available, but what there is, is good quality.	Available but only from manufacturer, no other sources.
AQUARIUS 1 Radofin £50	Chunky graphics — no user defined graphics. No sound, keyboard only a little better than the Sord.	Microsoft Basic but no editor, keyword or typed entry.	More than Sord or MC10 but again, only adequate.	Printer, memory, joysticks and discs available relatively cheaply.

COLOUR COMPUTERS — UP TO £100

The machines in this range offer more than the bare minimum performance and each has its own particular strong points. The Vic-20's software base is extensive and cheap. The Atari's software is the best, but expensive.

COMPUTER	Hardware	Operating System/Basic	Software	Accessories
ATARI 600XL £89	Very good real keyboard. Newish design. Sprites and good sound — 4 channel. 16K needs special tape recorder.	Very much better Basic than original Ataris. Nice screen editor with syntax checked data entry.	Some of the very best, but cartridges are expensive and soon cost a great deal more than the computer.	Printers, joysticks, discs, memory. Average prices — look for special offers.
VIC-20 £89	Good real keyboard. Limited characters per line 3 channel sound. 3K mem needs special tape recorder.	Limited Basic with a good line editor.	Very large number of quality cheap cassette games available. Some require additional memory.	Printer, joysticks, disc, memory, average prices.
TANDY CoCo £99	Moving key keyboard. Lowish colour resolution. 16K memory. Sound through TV speaker. RS232 port.	Line editor, abbreviated error messages show computers age.	Can run OS-9 on expanded system to provide user with mini computer feel. New learning book may be the shape of things to come.	All things available but do tend to be expensive. Can be extended to become a limited business machine.

LARGER MEMORY COMPUTERS — UP TO £150

The larger memory generally permits more extensive and better quality cassette-based games.

COMPUTER	Hardware	Operating System/Basic	Software	Accessories
DRAGON 32 £99.95	Real keyboard but feels a little tacky. Sound through TV. 32K.	Very similar to Tandy CoCo on which it was based.	Some good cheap software.	Printers, discs, joysticks etc, reasonably priced.
ATMOS ORIC £99.95	Good real keyboard. 3 channel sound.	A vast improvement over the original Oric 1 which had cassette loading difficulties.	The lower UK profile of the Oric/Atmos will not help in the availability of software.	Printers, discs reasonably priced.
SPECTRUM Sinclair (6 Pack) £129.95	Moving key rubber keyboard worst of this group, weak sound. The Spectrum is becoming overpriced in the current market.	Single keyword entry with full syntax check on line entry. Design becoming dated now.	By far the largest cheap quality software base of any UK machine. The standard by which other games are judged.	Printers, joysticks RS232 interface Microdrives etc. Generally cheap though some items could be cheaper.
AQUARIUS 2 36K £129	Good real keyboard. Limited chunky colour graphics. Sound through TV speaker.	Microsoft extended Basic with reasonable editor. Some of the feel of MSX in this Basic.	Limited software availability likely to be a problem.	Aquarius 1 accessories fit and just about everything available from printer, joysticks, memory to cheap discs.

THE BEGINNINGS OF BUSINESS USAGE — ABOUT £200

The Memotech has the ability to become a limited business machine but there is unlikely to be a tremendous amount of software for it. The Commodore has the software but not the ability. The Electron needs a fair amount of expansion which effectively changes the price bracket it occupies.

(continued on next page)

(continued from previous page)

COMPUTER	Hardware	Operating System/Basic	Software	Accessories
COMMODORE 64 £199	Average keyboard. Very good sound facilities, needs a special cassette recorder.	Minimal Basic, does have sprites but not easy to use, or sound, from Basic.	Do like cartridge football. Games tend to be more expensive than, say, Spectrum.	Everything — big selection.
ELECTRON ACORN £199	A cut down version of the BBC computer. Good keyboard. Single channel sound. Overpriced.	Runs slower than the BBC but quality Basic. Can run mixed Basic and machine code programs.	Quantity increasing all the time.	Needs expansion box before accessories can be hung on to computer.
MEMOTECH MTX £239	Very solid machine with average keyboard — includes separate numeric keypad.	Built in assembler/disassembler plus Noddy language besides Basic. Line syntax checker. Can expand to a CP/M system.	Limited in quantity but of reasonable quality.	Everything, but little choice.
AMSTRAD £240	Includes black and white monitor and built-in cassette drive. Quality keyboard and limited cassette control.	Nice operating system. Basic is quick but could be more user friendly in graphics and sound department.	Needs the colour monitor to really be used as a games machine. TV adaptor available. Some nice games.	New machine, items just beginning to appear.

TOP OF THE RANGE — ABOUT £400

These machines cover the top end of the games machine range and the bottom end of the business machines.

COMPUTER	Hardware	Operating System/Basic	Software	Accessories
BBC ACORN £399	Very old design. Not long before the new ABC's take over. Well overpriced because of captive market.	Very fast, against which all others are compared. Can run mixed Basic and machine code programs.	Not as good as specification is capable of producing. The best for educational uses.	Big choice in all price ranges. Can become expensive with a big footprint on the desk.
QL SINCLAIR £399	Uses the IBM alternative microprocessor (MC68008). The hardware is the best in the price range, still a few bugs to be knocked out.	Look out for 3rd party vendors to provide multi-user/multi-tasking o.s. that works. 4 software packages in price that are improving in quality — slowly.	Very few at present, but all the best software is being programmed for it at present. Worries about cartridges, pricing and piracy.	Needs care when choosing monitor and printer, they don't all work with the QL.
AMSTRAD £349	Includes colour monitor and cassette drive. Not always easy to read 80 column text but display rock steady. Stereo sound.	Quick Basic with nice editor easily learnt.	The B/W monitor is more suitable for business use. Some very good software.	Few at present but coming soon.
EINSTEIN £499	Includes a 500K 3" disc drive. Nice keyboard and reasonable sound.	Clean machine with Basic loaded from disc. CP/M capability.	Predominantly a business machine between the QL and the ABC's and the new Apricot.	Not much at present but it should be all available in time.
ADVANCE 86A £400	Upgradable to IBM PC compatible. Looks different from other computers with keyboard storage in main console. Good keyboard. Takes up a lot of desk.	Very nice full screen editor, the IBM standard Basic. Faster than IBM machine.	Surprisingly little for the basic machine, but masses for the full blown expanded version. Software is comparatively expensive.	Most IBM accessories are suitable, the cost is higher than other accessories listed.
ALPHATRONIC £347	Very good keyboard with excellent feel. Very limited graphics.	Full screen editor, with Microsoft Basic.	Very little, requires expansion to CP/M level before much software available.	Discs, printers etc to full CP/M compatibility.

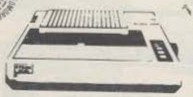
COMING SOON

Some new computers will be launched prior to Christmas and they will have varying degrees of success in achieving a place in the market. The following group is my assessment of the machines based on a brief encounter.

COMPUTER	Hardware	Operating System/Basic	Software	Accessories
COMMODORE 16 £140	The replacement for the Vic-20. Nice keyboard, good sound.	Better Basic but a very conservative specification.	Can't help but be good. Initially certain to be cartridge and expensive. There may not be a UK driven cassette base this time.	All Commodore accessories should fit.
ENTERPRISE £250	One year on from initial showing, the impact is considerable less. Whether a better buy than Amstrad is doubtful. Keyboards on the machine I've seen poor.	Good Basic but the competition is no longer overawed by the specification.	Bound to be good, but whether there will be sufficient to sustain the machine is questionable.	Coming soon.
COMMODORE +4 £250	Very nice feel to the machine with a good keyboard. Sound facilities not up to those of the CBM-64.	4 very simply built in packages, but they are quick and usable. Better Basic than 64. Packages are word processor, spreadsheet, database and business graphics — no sprites.	Certain to follow 64 standard, only question is the availability of cheap cassette-based software.	Some differences in the connectors may mean some new accessories. Joystick ports are different etc.
MSX £250	Can be bought in any shape, colour to suit taste. Real keyboards, moving key. From 16K upwards memory.	Bound to become THE home micro standard with the ability to run CP/M software when expanded.	Already substantial and before long all new games will be here first.	Everything including the new quick discs.

Printer Problem? 0730 68521 any day including Sunday and we will sort it out!

EPSON PRICE SPECIALS



EPSON RX80 (DOT MATRIX)	~~£249~~	£199	+VAT= £228.85
EPSON RX80FT (DOT MATRIX)	~~£285~~	£229	+VAT= £263.35
EPSON FX80 (DOT MATRIX)	~~£438~~	£324	+VAT= £372.60
EPSON MX100 (DOT MATRIX)	~~£475~~	£369	+VAT= £424.35
EPSON RX100 (DOT MATRIX)	~~£450~~	£389	+VAT= £447.35
EPSON FX100 (DOT MATRIX)	~~£560~~	£499	+VAT= £573.85

NEW! Canon PW-1080A £289.00

+ VAT = £332.35

80 cols; High speed printing, 160 CPS; bi-directional logic seeking; fantastic 27 CPS near letter quality; 23 x 18 matrix; very quiet - less than 60 dB; 4, 5, 6, 8 10, 12, 17 CPI; down loading for user-optional characters; high resolution graphics; handles various forms, roll paper, fan fold, single sheet and multipart copy paper.

ALSO AVAILABLE THE CANON PW1156A as above but 156 cols £399.00 +VAT= £458.85

PHONE 0730 68521 INCLUDING SUNDAY!

JUKI 6100 just £329 +VAT= £378.35

20CPS: Bidirectional & Logic 10, 12, 15 & Proportional Spacing; Wordstar compatable 2K Buffer; 13 inch Platen Underline; backspace & lots more Centronics Interface Standard

OPTIONAL RS232 TRACTOR AND SHEET FEEDER

SHINWA CP80 £179.00 +VAT= £205.58

Friction and tractor feed as standard. 80cps. Bi-directional logic seeking 13 x 9 dot matrix giving true descenders, sub and superscripts Italic printing and auto underlining Condensed, emphasised, expanded and double strike (can be mixed in a line). Parallel interface fitted as standard

WE WILL MATCH ANY GENUINE PRICE ADVERTISED SCI(UK) IS NEVER BEATEN ON PRICE

MANY MORE PRINTERS AVAILABLE 1,000s OF BARGAINS SEND NOW FOR THE FAMOUS SCI(UK) CATALOGUE

FIDELITY 14" COLOUR MONITOR & COMPOSITE VIDEO

£189.00 +VAT= £217.35

We have interfaces for all types of computers, including CBM 64, Vic 20, APPLE, TRS 80, IBM, BBC, SPECTRUM, QL ETC

24 hour nationwide delivery by Securicor £9.50 + vat. Bankers Orders; Building Society Cheques; Postal Orders; - same day despatch. All orders covered by the Mail Order Protection Scheme. Nationwide maintenance contracts arranged. Educational discounts very welcome.

SCI(UK)
TEL: 0730 68521

FREEPOST
(No Stamp Needed)
PETERSFIELD
HANTS GU32 2BR
TELEX 86626 MYNEWS G

DEALER ENQUIRIES WELCOME WRITE FOR DETAILS
PERSONAL CALLERS WELCOME

12 HIGH STREET, PETERSFIELD, HANTS GU32 2 JG

URGENT ORDER PLEASE SUPPLY
(SCI(UK)) FREE POST NO STAMP REQUIRED PETERSFIELD, HANTS GU32 2BR
Name
Address
Credit Card
Number

First, a question.

Who do you think are the world's most avid consumers of microcomputers?

The ingenious Japanese? The fashionable French? The acquisitive Americans?

Believe it or not, it's we British who own more micros per person than any other nation on earth.

Yet, despite its amazing impact, the microcomputer has only just begun to scratch at the surface of our lives. Without doubt, the best is yet to come.

Use and Abuse.

In several recent surveys, some astonishing facts about micro use and abuse were revealed.

It was discovered that the micro is hopelessly under-utilised. If you're already a micro owner, your own experience may well confirm this unhappy state of affairs.

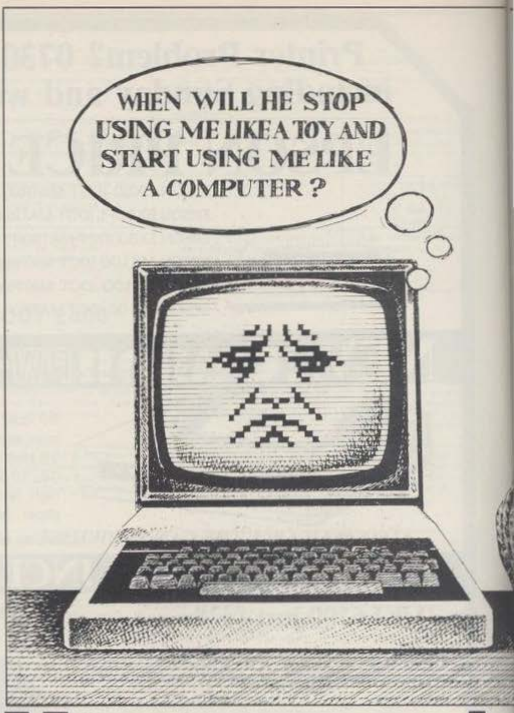
Brainpower. A source of knowledge.

For thousands of years, the key to self improvement has been in the hands of the written word. Now, thanks to the Brainpower range, it's very much in the hands of the micro.

As the Brainpower range demonstrates, this does not require prior knowledge of micros, or how they work.

The Brainpower concept has been devised as *integrated* applications and educational software. And its aim is to stretch both your mind and your imagination.

Each Brainpower title provides a unique three part package: an applications program, a teaching program and an illustrated manual and interactive tutorial – integrated applications and educational software.



Now you and y bring out the b

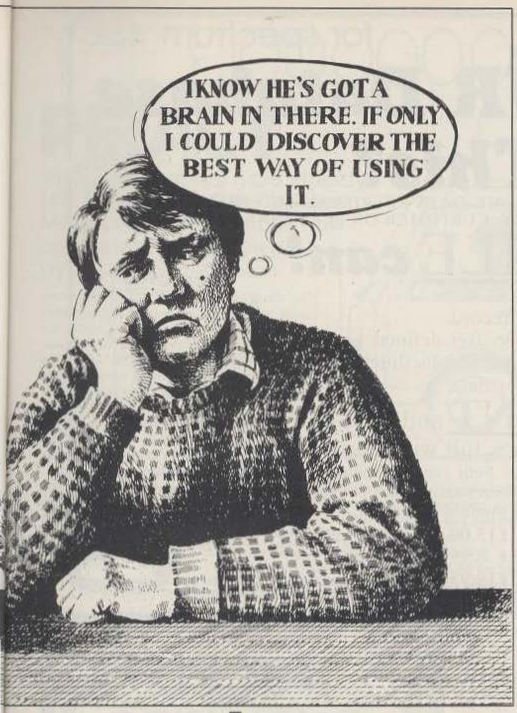
It offers a unique way to realise your own full potential and that of your micro. In a way you could never hope to achieve from the printed word alone.

In this respect, the Brainpower range stands on its own.

A unique concept.

All the Brainpower titles share one thing in common, apart from their stimulating subject matter, that makes them unique.

You will find each title comprises three distinctive elements: A teaching program that helps you to get to grips



our micro can st in each other.

with the subject at your own pace. An applications program to put what you learn into action. And finally, with each package, you get an expertly written book and interactive tutorial.

STAR WATCHER

The secrets of the heavens are yours. Isolate all the constellations as well as main stars for easy identification. Even turn stars and constellations on and off at will. Screen by screen, you will see exactly how the 1,500 brightest stars move through time and space. And all from any point on the Earth's surface at any time of the year.

Star Watcher is without doubt the definitive home observatory.

DECISION MAKER

Should you buy a new house? Change jobs? Have children? Start your own business? Such decisions should not be taken lightly. Armed with Decision Maker, you can be quite sure of examining every avenue, and arriving at a rational, structured answer.

If you value the way you run your life, you need Decision Maker.

NUMBERS AT WORK

Tackle all the number problems you're likely to face in daily and business life. From straightforward multiplication and division of fractions, through decimals, percentages, ratios, mark-ups and margins to compound interest, depreciation, VAT and PAYE.

Numbers at Work gives you a distinct edge, since you will be able to both understand and manipulate numbers at will.

PROJECT PLANNER

Project Planner teaches you how to divide even the most complex project down into meaningful components. Learn how to determine the length and importance of every single task, and those elements critical to the fulfilment of your plan. Even anticipate problems you hadn't envisaged.

You have the measure of any situation because you have the fullest possible grasp of all the factors which affect it.

FORECASTER

Forecaster takes the guesswork out of forecasting, by accepting that tomorrow's events will be best predicted on the basis of today's facts. Armed with Forecaster, sales targets and growth trends, even sporting events and election results can be accurately and very quickly predicted.

Invaluable to you in both your private and business life.

ENTREPRENEUR

Entrepreneur teaches you all the steps required to plan and start your own business. It will forecast your first 18 months' cash flows, generate your Profit and Loss Account and Balance Sheet. Help you in discussions with your bank manager and partners. Explain the notions of assets, liabilities, overheads, working capital, cash flow and break even point.

Invaluable to anyone who is planning a business venture.

	SPECTRUM 48K	BBC B Tape	BBC B DISK 40/80 Track	COMMODORE 64 Tape	COMMODORE 64 Disk
Tick your choice	£14.95	£19.95	£24.95	£19.95	£24.95
Decision Maker		N/A	N/A		
Numbers at Work		N/A	N/A		
Star Watcher		N/A	N/A	N/A	N/A
Entrepreneur		N/A	N/A		
Project Planner	N/A				
Forecaster	N/A				

Please add £1.50 for postage and packing

* I enclose a cheque or postal order, crossed and made payable to Triptych Publishing Ltd for £_____

* Please debit my Access/Barclaycard, number _____

NAME _____

ADDRESS _____

_____ POSTCODE _____

TELEPHONE _____ SIGNATURE _____

Send to: Triptych Publishing Ltd, (TBL Book Service Ltd) FREEPOST, CAMBERLEY, SURREY GU15 3BR. All goods fully tested and returnable if in any way defective. Allow 28 days for delivery. *Delete as applicable.

BRAINPOWER

campbell systems for spectrum 48k

Can YOUR Database Handle This?

With MYRMIDON'S Micro-Print & up to 51 columns!

PROFESSIONAL FILE MANAGEMENT, DATA RETRIEVAL AND PRESENTATION
ANY ADDRESS LISTS, INVENTORY, CUSTOMER OR PERSONNEL RECORDS...

MASTERFILE can!

Microdrive commands included; 32, 42 or 51 characters per line!; 26 fields per record; Unrestricted number of records; 36 user defined Display/Print formats; Fast search & sort facilities; Around 32K of RAM available for data!

Now with MF-PRINT and MASTERFILE version 09, you can format your data for a full width printer!

Works with most popular printer interfaces. Fully variable report widths (over 100 columns) and lengths. Powerful numeric editing and column totals. Almost no reduction in space available for data. *Many more products available. Send SAE for details!*

MASTERFILE version 09	£15.00
MF-PRINT	£ 6.95
MASTERFILE with MF-PRINT	£19.95

All programs mailed 1st class by return. Prices include VAT and postage within Europe.
New Address: Campbell Systems (Dept YC) 57 Trap's Hill, Loughton, Essex, IG10 1TD. England 01-508 5058

CS

STARBYTESTARBYTESTARBYTEST

THE £100,000,000 ROBBERY

PIRACY

Video companies have already felt the power of the pirates. Meirion Jones finds out how computer companies are trying to combat them.

NOT SINCE Johnny Kidd had them *Shakin' all Over* nearly a quarter of a century ago have the pirates been such hot news. Everybody's doing it from the market traders selling bottles of dubious yellow coloured water under the misspelt names of famous French perfumes to the upmarket jewellers selling bogus Cartier watches faked in Mexico.

As Terri Anderson of the British Phonographic Industry which has led the campaign against audio cassette counterfeiters explains "the whole business of intellectual theft is getting out of hand — there can hardly be a consumer product that you can't buy a pirated version of — shoes, jeans, records, software . . ." Even some software house heads admit to the temptation. "If you could photocopy cars" says David Potter of Psion — the company that has sold over 500,000 Flight Simulator programs to Sinclair owners "we'd all have Ferraris."

All the problems that the computer industry now has with piracy — an unauthorised copy of a program is made every three seconds — were experienced first in the audio and video industries. "Two years ago" as Peter Duffy, Director of Investigation of the film business's Federation against Copyright Theft says "every feature film that was released was pirated that week or before it came out".

The worst case was ET which was seen in millions of British homes, months before it was even premiered in this country. Unlike British software houses which originally concentrated their wrath on schoolkids making occasional copies to swop with friends, FACT went for the big boys. In alliance with BPI which was cracking down on audio copying they helped force through the 1983 amendment to the Copyright Act which Duffy says "totally transformed the position".

Raids on counterfeiters put many of them out of business with £2,000 fines and two year prison sentences as a deterrent. Projectionists hurrying out of the cinemas late at night as the last strains of God Save the Queen died away were ambushed by police before they could make an undetected overnight copy for the video pirates.

Audio tape counterfeiters were also hit hard by BPI raids although it is still waging a "Home-taping is killing music" campaign against casual copiers and demanding a levy on blank tape to reduce the margin between buying an album on cassette and taping it from a friend. But as the 1983 law has made it more difficult for the counterfeiters to make a dishonest living out of audio and video so they have moved into computer piracy where as Quicksilva director Rod Cousens points out "the law is a grey area".

Now that organised crime is moving in to computer game piracy the big software houses are taking a less hostile attitude to schoolkids who make a one-off swop for a friend. "Help us smash the counterfeiters and we won't send the police in on search and destroy missions to the home of every Spectrum owner" is the message.

The Federation against Software Theft — FAST — has been set up by the likes of IBM, Acornsoft, Sinclair, Microsoft, WHSmith, Thorn EMI and Virgin to get the same legal protection for software that already exists for records and videos. Nicholas Lyell the Member of Parliament for Mid Bedfordshire signalled the new initiative with a Ten Minute Bill in July which increases the chances that one day it will be made law.

He told Parliament "The video pirates who used to make pirated copies of video tapes and films, and whose activities are now being substantially curbed by the Copyright Amendment Act 1983 are now turning their attention to the piracy of software." He pointed out that "At least one operator has his own factory with sophisticated duplicating equipment and a substantial distribution network." He also explained the new realistic mood of the software houses "We are not after the schoolboy, but we are after the commercial pirates."

Industry figures like Quicksilva's Rod Cousens now see making copies for swaps as "an occupational hazard" which needs to be stopped by "technological advances" such as the speed loaders which make audio copying more difficult, and increased use of discs and cartridges. Anyone copying "for commercial gain" will feel the full force. Quicksilva was one of a dozen companies which backed August's Artic co-ordinated raids in Hull on small-time operations advertising their products in local papers.

Zap clubs too are on the target list of the companies. "They should be hit" says Mike Dixon of Frontrunner software — part of the K-tel group. Schools are blamed by many companies for not setting a good example. "Teachers are the worst offenders" according to Ranald Robertson of FAST. He blames this piracy "in the educaiton field as one of the main reasons for the lack of good educational software". Companies are unwilling to invest in development if they are going to sell insufficient units to cover the cost. That's why Ranald says "in the short term the user may gain but in the long term he will lose out."

The new conciliatory mood of software houses to their customers — instead of regarding them as the enemy seems to be paying off. Quicksilva has been surprised how many of the members of its Gamelords club have volunteered information to their Super Pirates Squad — which has helped to squeeze out some of the counterfeiters.

PIRATE HOTLINE

We want to know if anyone near you is selling counterfeited computer games. We are not interested in Johnny next door who has made one copy of an outdated game but in people who are making money by stealing other people's work. You can often tell pirated tapes by their lack of identifying marks on the cassettes — for instance the butterfly mark on Quicksilva products. Phone *Your Computer* Pirate Hotline on (01) 661 3465 and we will treat any information you give us in confidence.

BREAKING AND ENTERING

Confessions of a pirate. Our old friend Henry Morgan reveals the tricks of the zapper's trade, smashing the protection that hides program secrets.

Henry took jut half an hour to make a copy of Imagine's Zoom.

HACKERS OFTEN derive as much pleasure from defeating a company's protection mechanisms then breaking into the program, altering it to taste and making a back-up copy as they do from actually playing the thing, more so in some cases. This article specifically looks at some of the protection mechanisms applicable to the Sinclair Spectrum, but the principles and the moral of the story apply equally to all home computers.

Way back in 1982, when the first commercial games were marketed for the Spectrum, very few authors bothered to protect their programs. It seems that software piracy had not been heard of. These early programs offered no challenge to those who wished to copy them, all that was necessary was to have sufficient knowledge to read a program "header". This is the very short burst of 17 bytes which follow the first "tone" when a program block is loaded into a Spectrum, and comprises the information which the computer needs to know about that block; that is whether it is in basic or machine code, which part of memory it is to be loaded into, how much there is of it, does it auto-run and so on.

It is very easy to isolate and read headers, and so no Spectrum program can ever be made absolutely secure. Most software loads in two or more sections, all that was needed to copy a program back in those days was to Break into the Basic block, save it with the appropriate line to make it auto-run then load the code block and save it defining the start and length, all this information is available in the headers.

Of course it wasn't long before software houses realises that their work was all too easy to rip-off, and so a number of ingenious mechanisms began to appear to stop the home user from being able to break into the software.

Two simple mechanisms which soon appeared were the DF-SZ and the ERR-SP. I will explain what these are. If you read the Spectrum manual, you will find a section on the "system variables".

System variables, also known as run-time variables, are numbers held in a special part of the computer's memory whose only purpose is to allow it to know what it is doing and what is going on inside it. DF-SZ is a good example of a system variable, it lets the Spectrum know how many lines are to be reserved in the lower portion of the screen for reports. Normally there are two lines, and so DF-SZ holds the value 2. DF-SZ can be altered by POKEing a different value into 23659, which is its address in the system variables area. If its value is changed to 0, then there will be no spare lines available for the reports such as Break to be written, and the computer crashes if one is encountered. So you cannot just break into the program.

ERR-SP is a little more complicated in that it occupies two locations, 23613 and 23614. It points to an address in memory where an instruction is waiting to be performed if a report such as Break or Stop needs to be produced. It is very easy to point this variable to a part of memory which causes spectacular crashes if the program is broken into, simply by fiddling with the values using the Poke command. These two mechanisms will stop anyone from successfully breaking into a Basic program, but the Spectrum has a simple device to defeat them.

A Basic program can be Merged instead of Loaded, and instead of auto-running just sits there waiting for a hacker to list it! Clearly DF-SZ and ERR-SP were inadequate on their own as real protection.

As you know, blocks of machine code are normally loaded in and then run by short Basic programs which precede them, using a Usr command. Since it is so easy to disable any protection present in the Basic block, software houses had to look for methods of protecting the code itself.

Load in short bursts

Some programs can be found which load in very short bursts of bytes after the main block of machine code has been loaded, these serve to protect the main block which will crash if they are not present. Often they are mini programs themselves which modify the code in some way, either by providing data or by altering its position in memory. A determined copier will use his knowledge of header reading to simply load each section in and then save them sequentially, but wait . . . the copy crashes when run.

This is usually because of another system variable, Frames. This is actually a clock, it is incremented 50 times per second and the value is therefore constantly changing. Frames occupies three locations, although only one is usually checked by the protection mechanism. How does it work? A short block of three bytes is loaded into Frames, which will immediately begin updating the values. A short time later, one of the first set of instructions in the code block will compare this value with a pre-determined value held somewhere, it doesn't matter where, in memory.

If the result is not what it should be, that is if it was a copy then the program will direct the computer to do a system reset. This is not a difficult mechanism to disable, indeed there are several methods which hackers can and undoubtedly do use. Those with no knowledge of machine code will normally alter the Basic loader so that the block is loaded into Frames irrespective of where it was saved from. A more elegant approach is to disassemble the offending section of code and nullify it.

So, we see that the headers preceding blocks of code give the game away every time. It wasn't long before programs came on the market featuring sections of code which

Ant Attack: hard to crack.

PIRACY

loaded in without headers. To demonstrate how this works, it is necessary that you understand a little machine code, but do not worry, I shall explain all. The Spectrum Rom is actually a machine-code program that carries out all the Basic commands, including those involved in loading and saving software. Indeed, a large chunk of Rom is devoted to these procedures.

Save a block

It is quite possible to save a block of memory and it doesn't matter whether its Basic or code or whatever without a header, as long as the microprocessor, the computer's brain, is first told some basic facts about what you are doing. This has to be done in machine code, since there are no Basic commands that will do the job. The microprocessor — in the Spectrum its a Z80A — can be thought of as a chest of drawers, with the drawers in two rows, and given letters, A B C D E etc. These drawers are actually called registers, and registers next to each other can be paired if necessary, eg BC, DE. On its own a register can hold a number from 0-255, but a pair can hold 0-65535.

For a block to be saved without a header, the A register is loaded with the value 255, the IX register is given a number corresponding to the start of the block, the DE register pair is told the length of the block and the Rom save routine is called at location hex04C2, which by-passes the header mechanism.

Such headerless sections are themselves loaded in not by a Basic loader, but by a block of code.

The instructions which do so are extremely simple, again the A register is given the value 255, the IX register to a position of memory where the program is to go to and the DE register pair the length. Also, the Carry flag must be set, the F or Flag register is a sort of microprocessor system variables, Carry being one of the variables, that is, given a value of "1", and the Rom routine called at hex 0556.

The headerless system is ingenious, but it still relies upon a section of code which must be loaded in the normal way, and this is vulnerable to anyone with a disassembler. An increasingly popular trick is to load in a block of code, often without a Basic loader, which apparently auto-runs itself. This is a very simple technique, but it can be very effective if combined with headerless sections. How does a block of code autorun? As you might expect, it is due to our friends the system variables. You now know that these are continually updated by the computer and in effect at any one moment in time hold a complete record of the state of the computers memory.

If a block of code is saved so as to include the system variables the Basic program area and also the machine stack, a few bytes found just below Ramtop, it will run when loaded back in from where it left of — code blocks which autorun include a USR command just after the save. For instance:

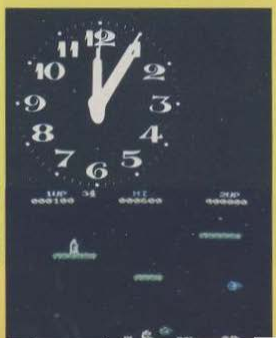
```
10 SAVE "NAME" CODE 23552, 4000
20 RAND USR 27000
```

where 23552 is the start of the system variable.

Copying a program saved in such a fashion is actually quite simple, and so it is really no deterrent to the hackers. If the program is not too long, a budding pirate could simply clear Ramtop to a suitably low address load the code above it and save from there.

When you want to play the thing, you merely load it back to the original address.

If the program length is too long to allow Ramtop to be covered to a sensible level, the pirate merely needs to generate an error report — but how? Quite simply, he or she loads the block in using either a machine coded loader, as previously described, with a length specification set too high. On encountering insufficient bytes on the tape the computer would be put back into Basic, allowing the hacker to continue from there. Easy isn't it?



But you say, what if DF52 or ERR-SP had been previously set? If you remember, the save routine produces a report in the lower screen when actuated, and so no auto-run code block can have these mechanisms. Unless it is a headerless block!

What does one do if the program block occupies the full length of Ram from 16384 the start off screen Ram to 65535 P-Ramtop. Again machine code is resorted to, but this time a short program is written from within system variables to load the program as a headerless block from 16384 to 65535 but excluding those bytes occupied by the loader. Such programs, complete with headerless files are no longer rare.

All the mechanisms that I have described, and one or two I still have up my sleeve, cannot stop a potential pirate from connecting up two cassette recorders and simply dubbing the programs. What they do however is make life awkward for the hacker. It does nothing to stop the large scale criminal pirates who are the ones that actually defraud the companies of their money by copying tape to tape. I do not believe that schoolkids or hackers defraud the companies of much revenue, simply because I am sure they probably spend all their available pocket money on games anyway, and even if they do pirate a few copies, in most cases simply because they've already spent their money.

The cake is only so big. Is there a system then that is fair to the hacker that actually buys the tapes, but makes life awkward for the large-scale pirates? There is. Owners of Jet Set Willy by Software Projects, or Night Gunner by Digital Integration will have noticed a protection mechanism requiring the input of a code before the game could be played — once again it is easy to nullify such a mechanism but the long scale copiers who actually need to mimic both the game and cassette inserts need to go to extra trouble — perhaps they won't bother. Mathew Smith with his Jet Set Willy could have made life difficult for the hackers with headerless files and so on, but chose not too — and witness the result.

Immense interest was generated in his game leading to all manner of Pokes being published in many computer magazines, which I am sure generated more sales revenue in turn — free advertising. In conclusion then, what is the hackers view?

The hacker probably likes a bit of a challenge, but no unfriendly 48K headerless autorun code blocks. He likes to dable around in the code, and may perhaps make a back up copy or two. How much does this defraud the software company? Not much. The only mechanisms so far which actually inhibits the large scale tape pirates is the colour code as seen in Jet Set Willy — and this is no obstacle for the hacker. So, 10 out of 10 for Mathew Smith and his fertile mind, I will certainly be looking out for his next offerings.

IMAGINE: WHAT WAS THE NAME OF THE GAME?

In 18 months Imagine shot from nowhere to the top and back again. Many blamed piracy for the collapse. Imagine's operations director Bruce Everiss disagrees . . .

THE POPULAR MISCONCEPTION of Merseyside is of a riotous Toxteth backing onto strike-bound docks. People see it as a fluke that the area has been the centre for pop music for the last 20 years. Now Liverpool's emergence as a leading force in the micro industry seems somewhat surreal.

The reality is that Merseyside has a fair share of the electronics industry with major companies such as Plessey and Marconi. The area also has an unfair share of traditional data processing with lots of big installations such as the National Giro, Royal Insurance, Littlewoods, the Ministry of Defence, BICC and Unilever. A further factor is the excellent reputation of the computer departments at Liverpool University and Liverpool Polytechnic and also the private sector training of computer staff at KBS.

Against this background it is not surprising that one of the first computer stores in Britain was set up in Liverpool and traded successfully in 1978. Microdigital's customers set up some of the earliest and most enthusiastic computer clubs in the country. Microdigital's staff often left to set up or work for new microcomputer firms, spawning an industry. Two well-known ex-Microdigital staff are Eugene Evans and Mark Butler. Microdigital was absorbed by Laskys in 1980 which resulted in yet more staff leaving to work elsewhere.

Among the Liverpool companies was one of the first games software houses, Bug-Byte, owned by Tony Baden and Tony Milner. Then, as now, the two Tonys ran their business cautiously, preferring safe gradual growth. Two staff at Bug-Byte, Mark Butler the sales manager and David Lawson a programmer, did not agree with this policy and sought a more aggressive approach.

Both were offered, and turned down, a share in the ownership of Bug-Byte. Due to the clash of personalities David Lawson was given notice in late 1982 followed by Mark Butler who left of his own volition. They formed Imagine Software.

Knocked on doors

David wrote a superb Galaxians/Invaders-type shoot-'em-up game, Arcadia, for the Vic-20 and Spectrum. Mark Butler knocked on doors and sold it. There was a shortage of software in the shops at Christmas 1982 which Imagine met by doing deals with duplicators and by trucking software all over the country. Arcadia went to number one and stayed there. Imagine invested the proceeds of its success in advertising and started a high-profile image that was to remain.

The economics of games software is like high-stakes gambling. To launch a game properly costs anything from £10,000 upwards and if it fails all is lost. If it succeeds it is a licence to print money as the manufacturing cost is so low compared to the retail price. Through 1983 all Imagine releases succeeded and thus Imagine became the undisputed number one games software house.

David and Mark found themselves in a situation that they were not equipped to cope with, catapulted from obscurity to fame and fortune in a few short months. Realising this they sought advisors, both professional and management. This advice, by and large, made Imagine more successful still. Eventually, however, by taking wrong advice and ignoring sound council, decisions were made that led to the downfall of Imagine.

Mistake number one was that Mark and David believed that Imagine's success proved them to be good businessmen and that they could thus apply their talents to other businesses. Against advice they tried to run an advertising agency, Studio Sting, along with Steven Blower. They gave Steven 10 per cent of Imagine and in return each owned a third of Studio Sting. Studio Sting failed. The reasons behind the failure are many but include the following: First, the relationship between the two companies was never defined and areas of responsibility were never laid down; second, there was insufficient management resources to have any control over events or to institute systems; third, when things started going wrong the relationship between Steven and his co-owners broke down.

Mistake number two was not employing a professional accountant until just before the end, again against advice. This meant that there was insufficient financial control. It was not possible to discover whether anything was profitable or not. Money was spent without knowing whether it could be afforded. Funds were not available when they were most needed. Incoming invoices were paid without being checked.

In the beginning none of this mattered because there was no much profit to finance them — hence the downfall. The wages bill was over £50,000 a month, not because of high wages but because of the large number of employees.

The rents and rates bills were enormous because of the insistence on prestige and because of moving twice to bigger premises while still paying for the premises vacated. Comparatively little was spent on advertising.

Mistake number three was the refusal to manage technical staff. David Lawson insisted that programmers, artists and musicians were special and that any attempts of management would reduce productivity, obviously the reverse is true. While the administrative, sales marketing, accounts and warehouse staff were well managed and earned their salaries the technical staff could do as they pleased. This was excused on the basis that they worked at home or because discipline would reduce creativity. The reality was that it took over 50 technical staff to produce Imagine's products, usually late and usually with bugs still in them.

Mistake number four was to be taken in by their own publicity instead of reality. This is an obvious human failing but one which they were warned to guard against, especially as the publicity seemed to create a largely false picture. An example is to take a

Operations director Bruce Everiss: "The economics of games software is like high-stakes gambling."

programmer and make him famous; after that no matter how good he is at his job he is held in esteem because of his publicity.

Mistake number five was the Marshall Cavendish project to produce 26 games across five machines — this was worth as much as £11 million to Imagine over two years. The first problem was not to give these games sufficient priority, thus losing the contract. The second problem was keeping on the staff and therefore the overheads after losing the contract.

Mistake number six was the Megagames. After six months work and at a cost of several hundred thousand pounds the games were nowhere near completion. It was obvious that Imagine could not afford the cost of writing them never mind the cost of mass-producing the special hardware necessary. Despite this Imagine's best resources were committed at the expense of producing any good "ordinary" games to pay to keep the company going.

Internal politics

Mistake number seven was allowing internal politics to flourish. The tougher things became the worse were the politics with certain people looking after their own naked ambition at the expense of the company. Certain wives were allowed to interfere at will with the running of the company. It became difficult for staff to identify the motives behind actions.

Despite the meteoric rise and fall of Imagine, some good things have come out of it. Imagine created the market as we now know it. By deliberately having a high profile and with the use of hype, especially in the national daily press, the games software industry was born. Prior to Imagine the industry was small and fragmented with its products appealing to a small specialist audience. Imagine popularised the industry and created a switch in consumer spend. The industry has gone from mail order to high street multiples.

Imagine led with product quality. Look at a few pre-Imagine games and be amazed at their crudity. Imagine set standards in playability, originality and use of graphics and sound that were quickly imitated by the whole industry. When Ultimate got ahead in graphics quality Imagine responded by employing professional artists to produce the bit patterns.

Imagine was departmentalised with clearly defined areas of responsibility and a well-developed management reporting system. The rest of the industry has largely followed suit.

Imagine showed the way with marketing software as a mass consumer product: Good PR is essential these days — Imagine was the first. Every new advertising idea was subsequently copied as were the insert cards.

Imagine had the first professional sales team with a sales manager, telesales and export telesales, sales and market research and an export manager. For the first six months turnover at least doubled each month. Eventually, well over half all sales were from export.

Imagine was developing a new type of product that was enjoyable as a game but which educated the player. The first such product, Sidney Meets His Match, was completed but never marketed.

Imagine was starting with the use of professional psychologists to look at game playing *per se*. By looking at the motivation the hope was to produce more playable, more addictive games.

Imagine's contribution

Imagine was looking at alternative input devices including electrodes to monitor brain waves and thus allow thought control of games.

The best thing to come out of Imagine is not yet obvious. Time will surely show that those people who worked at Imagine have a lot more to contribute to the microcomputer industry. Already, there are former staff working for Ocean, Bug-Byte and Software Projects using knowledge and skills gained while at Imagine. Many former staff have now formed their own companies doing what they did at Imagine but reaping the rewards for themselves.

Already, there are at least five new companies on Merseyside composed of these people. It is too early for any of them to have made their mark but there is little doubt that they will. A small flock of Phoenix rising from the ashes of Imagine.

NEWS

Issue 1 March 1984

...the name of the game

IMAGINE —

A SOFTWARE SUCCESS STORY

A year after its formation in the front room of a Merseyside house, Imagine Software Limited has mushroomed into the world's largest independent company in the fast-moving world of home computer games.

a £35,000 a year earning potential after Imagine's launch of his 'Wacky Waiters' for the VIC.

Other 'top ten' games have followed in quick succession. There have been 'cuties' like 'Ah Diddums' and 'Molar Maul' for the Spectrum, arcade-style 'Zoom' and 'Zip Zap' for the Spectrum, and the occasional outstanding game bought-in from programmers, such as 'Jump-

were among the first to use the processing power of the Apple and to rapid program development this has now been superceded use of Sage 'super-micros' with disk storage and the ability to line and simplify highly machine code routines.

Imagine also employ their time professional artists and to work with programmers ing the visual and aural new games.

For the future, Imagine

Program 1.

```
100 REM PROGRAM ONE : (C) AM CAPLE 1984
170 POKE53280,6:POKE53281,6:PRINT"□□□□□□                    GENERATING CODE"
180 PRINT"□                    PLEASE WAIT□□□□□"
185 PRINT"□DONE □0";TAB(17);"□LINES";TAB(31);"□TO DO □178          □"
190 LN=10000:ER=0:AD=49152
200 F=0:READA$:IFA$="END"THENPRINT"CODE OK":END
210 IFLEN(A$)<>24THENPRINT" WRONG NUMBER OF DIGITS":GOTO800
220 T=0:L=4:GOSUB900:IFERTHEN800
230 IFA$<>DTHENPRINT" BAD ADDRESS":GOTO800
240 L=2:N=0
250 GOSUB900:IFERTHEN800
260 POKEAD+N,D:N=N+1:IFN<8THEN250
270 TL=T:L=4:GOSUB900:IFERTHEN800
280 IFTL<>DTHENPRINT" CHECK SUM":GOTO800
290 LN=LN+10:AD=AD+8:K=LN/10-1000
300 PRINT"□□□";TAB(4);K;" ";TAB(36);178-K;"□□  □":GOTO200
800 PRINT" ERROR":PRINT"□ ";MID$(STR$(LN),2);" DATA":A$
810 PRINTTAB(8+10);"□":PRINT"□"
920 POKE53280,2:POKE53281,4:GOTO820
900 CH$,D=0:FORQ=1TOL:F=F+1:D$=MID$(A$,F,1)
910 IFD$<"0"ORD$>"F"OR(D$>"9"ANDD$<"A")THENPRINT" ILLEGAL DIGIT":ER=-1:RETURN
920 Q=ASC(D$)-48+7*(D$>"9"):T=T+Q:D=16*D+Q:NEXT:RETURN
```

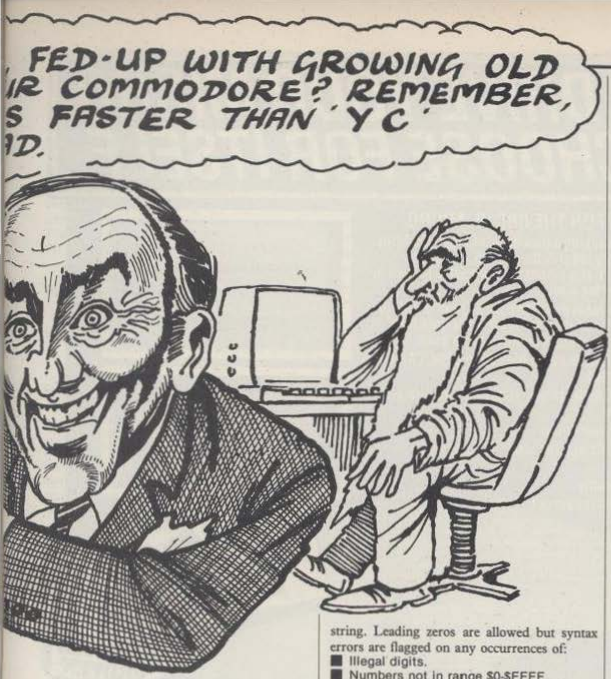
```
10000 DATAC00078AD0DDCA9008D0F008F
10010 DATAC009DCA0E0DCAC07DCA900AD
10020 DATAC010598D0FDCAD20D049008F
10030 DATAC01801BD20DC9D008D0071
10040 DATAC020EE9811EC2B00D50078
10050 DATAC0298E1059C602A900850077
10060 DATAC0308F4C84C0E0CF90530088
10070 DATAC038A58E3016A527C5280079
10080 DATAC040B003F900852685270062
10090 DATAC048A584CDC68E9A0E8D00E
10100 DATAC0502D0E0E36681C68F0087
10110 DATAC058D02RA48FA908958F0096
10120 DATAC060A50349FFA629F0070090
10130 DATAC068D1FBD0BF4C71C0910097
10140 DATAC070F B96FBE4FD0A06A50A97
10150 DATAC078FCC5FEF0B0E986FB00BC
10160 DATAC080D002E6FC68A868A00A94
10170 DATAC0886584A58E309CE6008C
10180 DATAC09026D0F1E6274C84C0007
10190 DATAC090A01B20R7C4900850077
10200 DATAC0A0FF850260A20D085007C
10210 DATAC0A82A9903D20D0A900077
10220 DATAC0B085BE852685278502074
10230 DATAC0B8A9008SF A97F8D00A9
10240 DATAC0CD8D01D0A9008D0E00A3
10250 DATAC0C8DC3D8F DCA900850A3
10260 DATAC0D4DCA9100D04DCA9FF00A9
10270 DATAC0D68D07DC9D06DCAD1400A6
10280 DATAC0E0038D9F02AD15038D001
10290 DATAC0E8A002A9008D1403A9007
10300 DATAC0F0C8D01503A5012900D07
10310 DATAC0F8501A9018D0EDCA90094
10320 DATAC100598D0FDCA9908D0D0096
10330 DATAC108D58A58F300RAD10087
10340 DATAC110DC38FA91E859EC60098
10350 DATAC118029A9008D0EDC8D0B8
10360 DATAC120FDCA97F8D0DDCA900AE
10370 DATAC128918D0DC203EC558008C
10380 DATAC130A52A8D20D60859300E
10390 DATAC138A5AFA01F00A5A93008I
10400 DATAC1404CEDF526C1B4C2A00C
10410 DATAC1480ID10FBA59349010077
10420 DATAC150290118691C859EA00071
10430 DATAC158FFC9C4B7F024B1B00A5
10440 DATAC160C93A0DF52077C4B0001
10450 DATAC168D5204FC4B006A90B074
10460 DATAC170384C3FC2A58B5FC1005
10470 DATAC178A58C85C2A5B929FE00A5
10480 DATAC180518A93C85FBA9500097
10490 DATAC188SFB A90385FC85FE00AE
10500 DATAC190A9F8528A900852900A7
10510 DATAC198209FC9850210C8A0E2
10520 DATAC1A030C2A063202FF1A00068
10530 DATAC1A8008941032D2FFC8007E
10540 DATAC1B0C010D0F5A202A93A0074
10550 DATAC1B8204CC2A204A92D200074
10560 DATAC1C04C2A00FFC3C4B7F00094
10570 DATAC1C812B1BPC93AF00CC0008F
10580 DATAC1D10B0F1D94103F0EC007D
10590 DATAC1D94C82C1A000893D3007A
10600 DATAC1E099FB00C8C004D0F500C
10610 DATAC1E8AD C034A05B92901007F
10620 DATAC1F0D026A5C1B5FB85C2009
10630 DATAC1F885FCA3F0338ED3D0AE
10640 DATAC2000385FDAD4003ED3E0084
10650 DATAC2080395FEA5FB1965FD009C
10660 DATAC2108SFD85FC65FE85FE0084
10670 DATAC218A5B5295B5FB85C1000F
10680 DATAC220A5FE85C2A5048520085
10690 DATAC2282098C0A05820DCC40071
10700 DATAC2302019C54602007R50059
10710 DATAC2389EA62DA42E6020EA003D
10720 DATAC240C4A5B92902D0F2960030
10730 DATAC248C1A4C20048A9202000CC
10740 DATAC250D2FF6820D2FFA9200092
10750 DATAC2582D2FFA92420D2FF00092
10760 DATAC260BD3C0320ED C2CA8D008F
10770 DATAC268C034C6DC248A4A0007
10780 DATAC2704A4A2078C268290F0078
10790 DATAC278C90A900269066930008E
10800 DATAC2804CD2FF78A0D0DDCA00AE
10810 LATAC2880109089501AD20D00064
10820 DATAC290A9189D20D0A58B8D0080
10830 DATAC2980ADC58C8D85DCA00A9
10840 DATAC2A00EDC09018D0EDC850092
10850 DATAC2B802A50129F850160008F
10860 DATAC2C0A68A6858A0A02E0086
10870 DATAC2E20A7C490016A0R52006D
10880 DATAC2C0C9009002D0C4780079
10890 DATAC2C9A97F9D0DDC8D0DD00C2
10900 DATAC2D0D1403D9F02AD150086
10910 DATAC2D03DA002A9938D14007F
10920 DATAC2E003A9C28D150A900079
10930 DATAC2E8D0ED9F02AD0D0DC0D7
10940 DATAC2F0A9705SB9D04DCA9009C
10950 DATAC2F003850C85DCA4280094
10960 DATAC300A200A928D20D0A0006B
10970 DATAC308EDC09018D0EDC50091
10980 DATAC310A9055A2A5C0F9FC006D
10990 DATAC318A01DC1012C0D0F0007F
11000 DATAC320B0DE8A90E8D20D0008E
11010 DATAC328A000A01DC307A90071
11020 DATAC330IE85FE4C6DC38IFE009D
11030 DATAC338A000A0000E8E6C20A0A
11040 DATAC340A201A900IE85FC0070
11050 DATAC348A602F0FC88D0EFA6009D
11060 DATAC350FBE4FD006A5FCC500AR
11070 DATAC358FEF00AE886FFD0C00B3
11080 DATAC360E6FC4C2RC3R9008500SF
11090 DATAC368D2A502F0FC78900007C
11100 DATAC370D0EDC203EC520D0008F
11110 DATAC378C4596005FBA5BRC900A1
11120 DATAC3900IF005A5F4CEDF5094
11130 DATAC388AD2ED0852A90085007E
11140 DATAC3909E6A6B3D9205AF0008
11150 DATAC398D4003A5C18D2D0300B0
11160 DATAC3A0A5C28D3E03A5E92900BD
11170 DATAC3B0108A9918D3C03A00067
11180 DATAC3B0FFC9C4B7F04EB1B00B1
11190 DATAC3B8C93AF00AC010D0F10025
11200 DATAC3C0994103AC1C3B40200AE
11210 DATAC3C82077C4B01EA58B8D0094
11220 DATAC3D03D3A58C8D3E0380008F
11230 DATAC3D0204FC4B00EC92D00093
11240 DATAC3E00A2077C4B005204F006C
11250 DATAC3E8C4B00A90D3B60050092
11260 DATAC3F0E8D3F0338ED3D030094
11270 DATAC3F8A58C8D4003ED3E030094
11280 DATAC40B9E9A402A920C0100062
11290 DATAC408D009941C3C0100E6
11300 DATAC410D0F9A93C85FBA950096
11310 DATAC418B5FDA9038SFC85FE00A
11320 DATAC420A9205202B6C2A5006E
11330 DATAC428ED013A200BD3D030079
11340 DATAC4305FBE8E004D0FEA90098
11350 DATAC438A9005202B6C22019067
11360 DATAC440C5A5C9D20D0C5C000A
11370 DATAC448F00236604CEAC4C8009A
11380 DATAC450C4B7B007B1BPC920082
11390 DATAC458F0F51B6C0C4B7B00090
11400 DATAC460141BE38E930900D078
11410 DATAC468C90A900SE9C79005007A
11420 DATAC470C910F0160B36B0200052
11430 DATAC4784FC4B829C924D025007
11440 DATAC480205C4B20285B8A9007B
11450 DATAC488005BC205CC4900206F
11460 DATAC490150A20A0C8B205C0D6B
11470 DATAC498B0PCAD0F718C58B0097
11480 DATAC4A0B5B4C3BC4386020080
11490 DATAC4A8D0C4F018202FF1A9008
11500 DATAC4B00D20D2FFAD01DC30008B
11510 DATAC4B8D0F01E859E380020002
11520 DATAC4C0DC4D0F0R501291F0080
11530 DATAC4C8950 1A9008SC0180060D
11540 DATAC4D0A9102401D022401004E
11550 DATAC4D8180A000A200AD010062
11560 DATAC4E0DC1006CA0D8F8B8D0095
11570 DATAC4E8F260A008D04D4A9005E
11580 DATAC4F0C38D00D4A9408D01008I
11590 DATAC4F8D4A900A9FF8D02D400A4
11600 DATAC500A9078D03D48D05D4007F
11610 DATAC508A9F98D06D4A9418D0D9D
11620 DATAC5104D4A9408D04D4180071
11630 DATAC518A0A0685C0A5018000E8
11640 DATAC520285501A90D20D2FF0072
11650 DATAC528A0A9368D300A9C10078
11660 DATAC530BD310A97B8D320300072
11670 DATAC538A9C 5B20385A0D0F0091
11680 DATAC540028D1403AD0A020D006C
11690 DATAC548150A9258D04DCA90095
11700 DATAC550408D05DCA901808D0E0094
11710 DATAC558DC60A0008SB85B90091
11720 DATAC560A0018SAA9385B008E
11730 DATAC568A9C585BCA90C85B700A5
11740 DATAC570A9008SFB9C085FC0059
11750 DATAC578A28FA0C5A9F820D800A2
11760 DATAC580FF186056464C20420074
11770 DATAC588AF444520312E3000005E
11780 DATAEND
```

Printers beware! Andrew Capel's speed loader also makes programs tough to crack for audio-copiers.

VFL IS AN alternative Datassette communications program for the CBM-64. Not only does VFL improve on speed and reliability but on versatility as well. It runs in approximately 1.5K bytes, and fluctuates between 1,500 and 3,000 baud giving an average of roughly 2,200 baud for an evenly distributed file.

Here is a list of VFL's features:

- Communicates up to 9.5 times faster than the normal kernal routines.
- Runs directly from Basic replacing the original CBM V2 Load, Save and Verify commands.
- Code may be saved without resorting to machine code.
- Code may be force-loaded to any specified location.
- Invisible loading facility, preserving the variable pointers.
- Full error reports.
- Occupies no Basic program area.
- May be called in machine code using the standard kernel routine addresses and formats.
- Visual and audio task completion signals.



- Full motor control.
- Retains video output.

To link the new routines to the operating system the system vectors ILoad and ISave must be altered. A small program within VFL changes these vectors and may be called by:

SYS 50473

Once ILoad and ISave have been changed Basic will call on VFL until:

- Obviously power down.
- A system restore is called.
- A 6510 BRK instruction is executed.

In cases two and three the system call above will rechain VFL. Case one poses much more of a problem.

SAVE
SYNTAX:
SAVE [<FILE-NAME STRING>],
[<DEVICE NUMBER>],
[<SECONDARY ADDRESS NUMBER>]
DEFAULT : NULL STRING,1,0

Only the first 16 characters of the file-name are saved on the header. Names shorter than the limit are padded with trailing spaces. When a colon is included anywhere in the file-name string it will signal the end of the file-name and the presence of two numeric parameters. These two numbers represent the addresses of the first and last bytes sent to the Datassette.

They should be written in hexadecimal, prefixed by a dollar sign and separated by a dash. Spaces are permitted between the colon and the first dollar sign, the last digit of the first number and the dash, the dash and the second dollar sign and between the last digit of the second number and the end of the file-name string. Leading zeros are allowed but syntax errors are flagged on any occurrences of:

- Illegal digits.
- Numbers not in range $0-$FFFF.
- Second number is less than the first.
- Any character other than a space between the colon and first number, first number and dash etc.

The secondary address number:
Bit 0 = 0 code relocatable on load
Bit 0 = 1 code may not be relocated and is always loaded back at the address from which it was saved.

Once your command has been accepted the usual motor tests are performed, which may result in a prompt. When the appropriate keys are closed VFL pauses for a second to allow the Datassette to reach operating speed. While the header tone is being sent the border displays static, red and cyan bars. When data is being transmitted the bars are more active, are narrower, and change to light grey and light blue. When all the data has been despatched a tone will sound and the motor is stopped. An example is:

SAVE"FRED:$8000-$8000",1,1

This saves one byte from address 32768 with a file-name of Fred (+ 12 spaces) and protects it from force-loading.

LOAD/VERIFY
SYNTAX:
LOAD [<FILE-NAME STRING>],
[<DEVICE NUMBER>],
[<SECONDARY ADDRESS NUMBER>]
DEFAULT : NULL STRING,1,0

The file-names on the cassette are only compared as far as the length of the file-name in memory up to a maximum of 16 characters. Any characters over this limit will be ignored but no error will be generated. If a program is saved by typing:

SAVE"HERBIDATIOUS"

it may be loaded by typing:

LOAD"HERBI"

Again a colon is significant, but in this case only one number is expected by the syntax.

(continued on page 81)

CBM-64 QUICK LOADER

The preloader.

```
10 REM* PRELOADER : (C) AM. CAPLE 1984
20 P=PEEK(2054):IFP=43THEN80
30 POKE2054,P+1:POKE53280,6:POKE53281,6
40 PRINT"[RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS]VFL IS LOADING"
50 FORF=1TO200:NEXT:PRINT"[RVS]"
60 POKE56,207:POKE52,207
70 LOAD"",1,1
80 PRINT"[RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS][RVS]VFL HAS LOADED[RVS]";:SYS50473
90 POKE56,160:POKE52,160:NEW
```

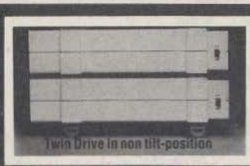
THE DISK DRIVE YOUR MICRO WOULD CHOOSE FOR ITSELF

THE TEAC 5¼" DISK DRIVE FOR THE BBC 'B' MICRO

Any self-respecting BBC 'B' Micro seeking a disk drive of high reliability and performance would immediately identify the TEAC 5¼" as the complete solution. A quality product, it is extensively industry-proven in major systems applications all over the world.

Now available for the home, educational or office user by mail order from Computamate, the TEAC 5¼" Disk Drive guarantees trouble-free high speed data access every time: and what more could a micro ask?

- **Single and dual models available with capacities up to 800K. (All 80 track models are switchable 40/80).**
- **Supplied with leads, utility disk, instructions: ready for use with your BBC 'B' Micro DFS Disk Interface.**
- **Oatmeal moulded box to match your micro.**
- **Fully stackable, plus extending tilt-action "legs" to ease disk insertion.**
- **12 months parts and labour warranty.**
- **Computamate is supported by the resources of a major multi-national public company.**



TEAC

From **£94** Ex VAT

INDUSTRY PROVEN

How to order:

By post – complete the coupon with your requirements and return to: Dept. YC 11, Computamate Data Products, Scotia Road, Burslem, Stoke on Trent, ST6 4DX Enclose your cheque/P.O. (made payable to Computamate) or use your Access/Barclaycard number.

By telephone – ring 0782-811711 to purchase by phone (credit card holders only).

SATISFACTION GUARANTEED OR WE WILL REFUND YOUR MONEY.

computamate

(Computamate Data Products is a division of Thomas French and Sons PLC)

INTRODUCTORY PRICES ONLY

SINGLE DRIVES	COST (incl. VAT)	QUANTITY	TOTAL (£)
FD-55A SS 40TK 100K	£108.10		
FD-55B DS 40TK 200K	£129.95		
FD-55E* SS80TK 200K	£135.70		
FD-55F* DS 80TK 400K	£164.45		
TWIN DRIVES			
FD-55A SS 40TK 100K	£212.75		
FD-55B DS 40TK 200K	£253.00		
FD-55E* SS80TK 200K	£253.00		
FD-55F* DS 80TK 400K	£309.35		
DUAL DRIVES (with integral power supply, available only in metal non-tilting box at present)			
FD-55A SS 40TK 100K	£301.30		
FD-55B DS 40TK 200K	£342.70		
FD-55E* SS80TK 200K	£343.65		
FD-55F* DS 80TK 400K	£399.05		
Post and Packing (First Unit)	£5.75		
Post and Packing (each additional unit)	£2.50		
*Price includes 40-80 switch			
MEDIA			
Box of 10 Diskettes 40TK SS	£18.50		
Box of 10 Diskettes 80TK SS	£21.25		
Box of 10 Diskettes 80TK DS	£27.00		
Postage & Packing per box of Diskettes	£1.00		
		TOTAL £	

Post to: Dept. YC11,
Computamate Data Products, Scotia Road,
Burslem, Stoke on Trent, ST6 4DX

Name_____

Address_____

Post Code_____ Telephone_____

*I enclose cheque/P.O. for £_____

*Please debit my Access/Barclaycard Number_____

Signature_____

(Credit Card orders must be signed by the card holder. Address above must be the same as card holder)

*(Please delete as appropriate)

For further information on these products, or for details of other exciting products, including TEAC 3½" and 3" Disk Drives, telephone 0782 811711.

Enquiries from Dealers and Educational Authorities welcome.

(continued from page 79)

This follows the format as described in the Save instructions and will give errors for the same reasons. Its value represents the address of the memory location where the first byte of the saved file will be stored. Enclosing a force load will automatically over-ride Bit 0 of the load secondary address number but will be over-ridden by Bit 0 of the save secondary address number.

The secondary address number:

- Bit 0 = 0 Code loaded to the address supplied by the force load. Defaults to $0801.
- Bit 0 = 1 Code loaded to the address from which it was saved. NB. This bit is over-ridden by a force-load value.
- Bit 1 = 0 The variable pointers are redefined according to the address of the last memory location altered by the load command.
- Bit 1 = 1 The variable pointers are restored to their values prior to the load command. NB. Basic load destroys all present variables.

Once VFL finds a header file the file-name and addresses of first and last bytes of save are displayed on the screen. These values are derived from the header information and may not be the addresses of the code's destination.

When VFL is searching for the correct file the border displays red and cyan bands. Once the information is being read the border flickers light grey and light blue. To stop the CBM/Run Stop key combination resulting in an immediate break error, follow these steps:

- Hold the CBM key down.
- Press the Run/Stop key.
- Release the Run/Stop key.
- Release the CBM key.

On completion of Load, Save or Verify commands a tone on oscillator one will be triggered. To achieve this VFL sets the pulse width registers, the frequency value and the ADSR controls. VFL then gates the pulse waveform producing a ping sound, however the master volume control is not affected. To make this tone audible the MVC must be set to some non-zero value.

To make a copy of VFL these instructions must be followed carefully. First key in the preloader program and program 1 then save them on two separate cassettes. It is important that the listings are followed to the letter, as line numbers and Rem statements are important. Also the preloader program must not be Run before it is Saved on tape.

Now try Running program 1.

Each line contains enough information to generate eight bytes of object code. The first four hex digits give the address of where the first of the eight will be stored. Next follow eight pairs of digits giving the values of each of the eight bytes. Finally another four-digit number gives a check sum relating to values of the first 20 characters in the data line. If an error is generated, correct the offending line then resave, verify and rerun the program. When a code OK report is flagged resave the program just to make sure. Now type New and load in the preloader. Without rewinding the tape type:

```
SYS 50522
```

and press play and record on the datassette. This saves a copy of the object code. Now

rewind the tape and engage the auto load/run sequence. The preloader should load in the object code, chain VFL to basic and clear itself. If Save, Load or Verify errors persist check program 1, correct it, and repeat the code saving procedure.

Program 2 may be used to disassemble the object code. If you use this routine to debug the code file, note that there should be no invalid op-codes before the address 50568 decimal ($C588 hex).

Program 2.

```
10 REM PROGRAM TWO : (C) RM CAPLE 1984
20 POKE53280,6:POKE53281,6:PRINT"■";
100 DIM$(56):FORF=0TO56:READ$(F):NEXT:DIM$=$(15)
101 C$(0)="-4E5[4[4E2X2[404E0X3[4[4E1X1[4"
102 C$(1)=",:E6[4[4E7X7[404E9[4[4E8X8[4"
103 C$(2)="?1$5[4[4)2$2J2[4[4$0J3[4)1$1J1[4"
104 C$(3)="■:$6[4[4$7J7[4048$9[4[4$9J8[4"
105 C$(4)="L4:5[4[4:2C2[4F4:0C3[4)1:1C1[4"
106 C$(5)=",::6[4[4[4:7C7[424:9[4[4[4:8C8[4"
107 C$(6)="M4$5[4[4$4B2X2[4H$4B0K3[4);#1K1[4"
108 C$(7)="/:#6[4[4[4$7K7[404$9[4[4[4$4B$K8[4"
109 C$(8)="L4R5[4[4T2R2S2[494[4X4[4T1R1S1[4"
110 C$(9)="$:R6[4[4T7R7S[424R9X4[4[4R8[4[4"
111 C$(10)="B0$5R0[4$2B2R2[4V4B0U4[4B1B1R1[4"
112 C$(11)="'/$6[4[4$7B7R[4349$W4[4B0B0R9[4"
113 C$(12)="6B45[4[4624272[4=44094[4614171[4"
114 C$(13)="+46[4[4[44777[4[449[4[44B7B[4"
115 C$(14)="5B45[4[452N2;2[4<4N0D4[451N1;1[4"
116 C$(15)="(N6[4[4[4N7;7[4P4N9[4[4[4N8;8[4":DIM$(12):FORF=0TO12:READ$(F):NEXT
200 PRINT"□■ *** DIS-ASSEMBLER (C) RMC 1984 ***■"
205 INPUT"■ START ADDRESS ..............   49152■■■■■■■■";RD
210 INPUT"■ END ADDRESS ................   50576■■■■■■■■";EN
220 INPUT"■ OUTPUT DEVICE NUMBER ........   3■■■";DE
230 INPUT"■ SECONDARY ADDRESS ...........   0■■■";SA:OPEN4,DE,SA
235 PRINT#4:PRINT#4," DISASSEMBLY OF";RD;"TO";EN:PRINT#4
250 D=RD:L=4:GOSUB8000:L=2:O$=" $"+D$+" : "
260 D=PEEK(RD):F$=MID$(C$(INT(D/16)),(DMD15)*2+1,2):MD=ASC(RIGHT$(F$,1))-48
270 GOSUB8000:O$=O$+D$:V$="":N=M(MD)
280 FORG=1TO2:IFN=0THENO$=O$+"   ":GOTO291
290 RD=RD+1:D=PEEK(RD):GOSUB8000:O$=O$+" "+D$:V$=D$+V$:N=N-1
291 NEXT:ONMD+10OTO360,350,350,355,370,310,320,330,330,340,300,305,340
300 Q=PEEK(RD):D=RD+1+Q+(Q>127)*256:L=4:GOSUB8000:L=2:V$="$"+D$:GOTO370
305 V$="($"+V$+")":GOTO370
310 V$="($"+V$+",X)":GOTO370
320 V$="($"+V$+"),Y":GOTO370
330 V$="$"+V$+",X":GOTO370
340 V$="$"+V$+",Y":GOTO370
350 V$="$"+V$:GOTO370
355 V$="A":GOTO370
360 V$="#$"+V$
370 PRINT#4,O$;" : ";I$(ASC(F$)-35);" ";V$:IFRD<ENTHENRD=RD+1:GOTO250
380 PRINT#4:PRINT#4," OK FINISHED":PRINT#4:CLOSE4:END
8000 D$="":FORF=1TOL:DX=D/16:R=D-16*DX+48:D=DX:IFR>57THENR=R+7
8010 D$=CHR$(R)+D$:NEXT:RETURN
9000 DATABRDC,AND,ASL,BCC,BCS,BEQ,BIT,BMI,BNE,BPL,BRK,BVC,BVS,CLC,CLD,CLI,CLV
9010 DATACMP,CPX,CPY,DEC,DEX,DEY,EOR,INC,INX,INY,JMP,JSR,LDA,LDX,LDY,LSR,NOP
9020 DATAORA,PHA,PHP,PLA,PLP,ROL,ROR,RTI,RTS,SBC,SEC,SED,SEI,STA,STX,STY,TAX
9030 DATATAY,TSX,TXA,TXS,TYA,???
9040 DATA1,2,1,0,0,1,1,1,2,2,1,2,1
```

BEYOND

CHALLENGING SOFTWARE

Psytron... Contender for game of the year. Personal Computer News.

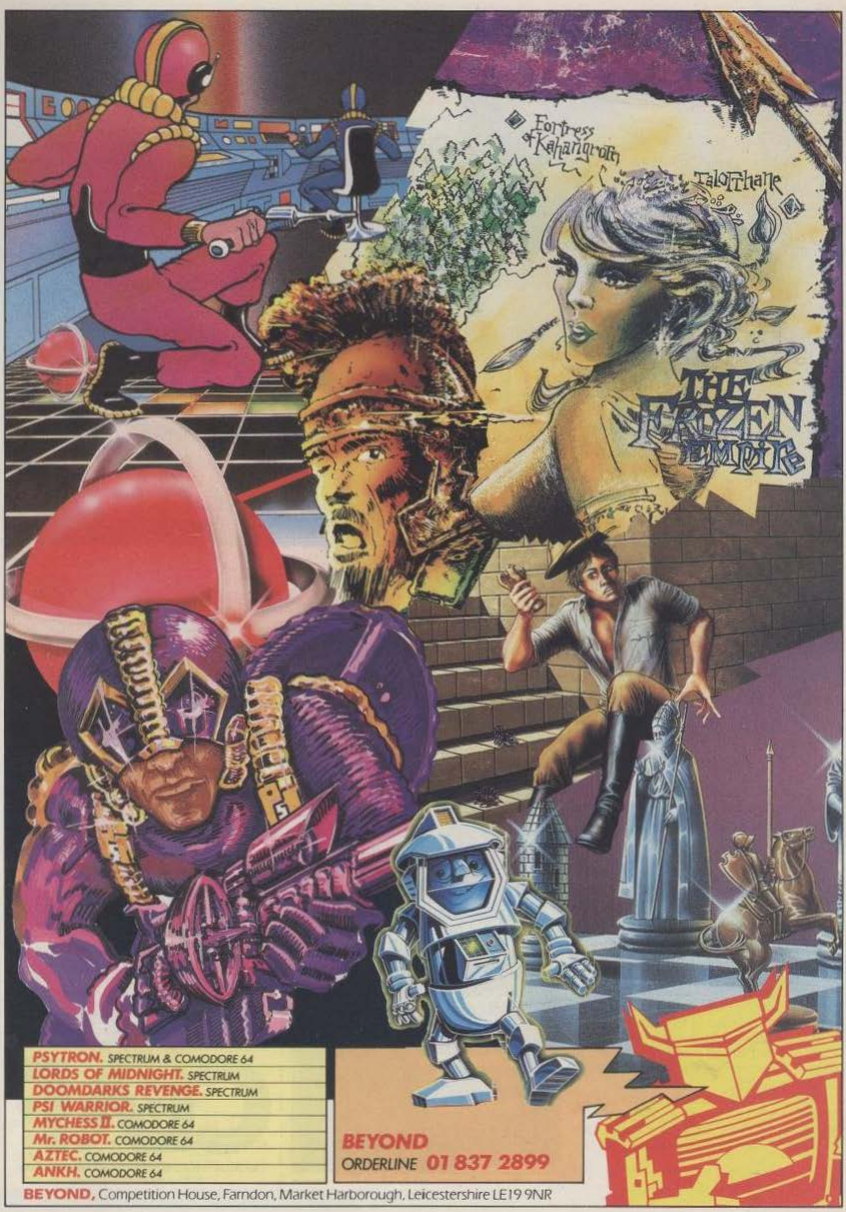
Lords of Midnight THE game for the Spectrum Personal Computer Games

You can profit from our success

Psytron — Graphically brilliant. Daily Mail

LORDS OF MIDNIGHT the thinking persons computer game Micro Adventurer

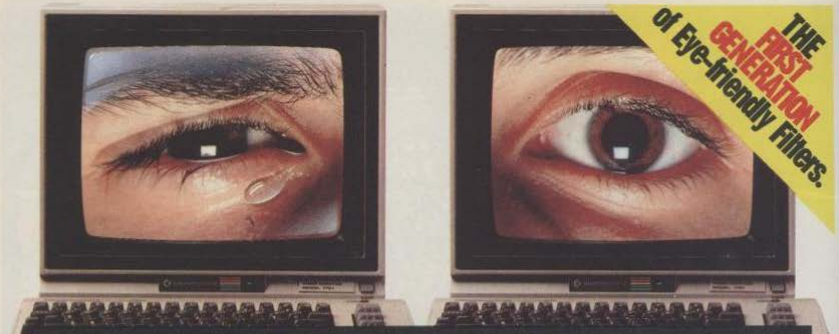
Psytron - An enormous program Crash.



PSYTRON.	SPECTRUM & COMODORE 64
LORDS OF MIDNIGHT.	SPECTRUM
DOOMDARKS REVENGE.	SPECTRUM
PSI WARRIOR.	SPECTRUM
MYCHESS II.	COMODORE 64
Mr. ROBOT.	COMODORE 64
AZTEC.	COMODORE 64
ANKH.	COMODORE 64

BEYOND
ORDERLINE **01 837 2899**

BEYOND, Competition House, Farndon, Market Harborough, Leicestershire LE19 9NR



Treat your eyes to a Romag CEAF. Only £19·95

Unique technology: British made laminated glass, aspherically curved Contrast Enhancement Antiglare Filter.

Up to now, contrast-enhancing filters have always been flat—and so has their performance, because the screen of your TV, monitor or VDU is curved.

Up to now, most filters have been plastic — because it takes mindbending technology to bend optical-quality laminated glass.

Up to now, filters have been expensive — awkward production techniques have meant price tags from around £50 to well over £100.

Forget all that: the Romag CEAF is here. British designed and manufactured by space age military technologists, CEAF is profiled to fit your display screen, giving you the ultimate in contrast enhancement and antiglare performance. For under £20, this first generation of eye-friendly filters diffuses all specular reflections, gives sharper image clarity from edge to edge of the screen and greatly enhances display colours.

Mounted and removed in seconds by invisible velcro fastenings, the anti-static, anti-shatter CEAF is a major step forward in the operational safety of computer displays—unprotected screens can cause blurred vision, watery and itchy eyes, headaches and (according to such authorities as the Institute of Ophthalmology) even permanent changes in eyesight.

Scratch-resistant, durable and easily cleaned without expensive sprays and agents, 9", 12" and 14" CEAFS are available from leading retailers at only £19.95 including VAT.

Or fill in the Freepost coupon and your CEAF will be despatched within 48 hours. Orders can also be placed around the clock by phoning the CEAF Department on (091) 414 5511, quoting your Access Card number. For other screen sizes, please ring or write—the CEAF prices for 'specials' would be considered very competitive.... if there was any competition!

ROAD FROG by courtesy of Ocean Software. MTA 4628

To ROMAG, FREEPOST, CEAF Dept. YC, Blaydon on Tyne, Tyne & Wear NE21 4BR. Telephone: (091) 414 5511.

My TV/Monitor/VDU is: _____ (make)

_____ (model) _____ (size)

My Computer is: _____ (make/model)

Please send me: _____ 9" CEAF(s)

_____ 12" CEAF(s)

_____ 14" CEAF(s)

at £19.95 each, inc. P&P.

I enclose cheque/P.O. No. _____

for £ _____ made payable to ROMAG.

OR My Access Card No. is

Name _____

Address _____

_____ Tel: _____

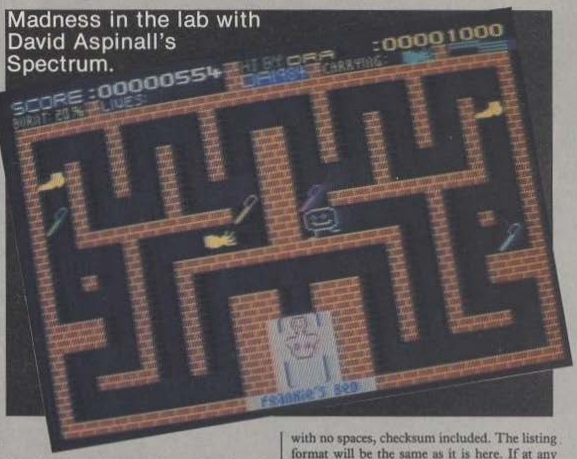
ROMAG CEAF

The filter which eliminates all competition

CEAF is a Registered Trade Mark.

ALIQUID

Madness in the lab with David Aspinall's Spectrum.



EVERYTHING IS going wrong for Professor Hilfe today. First, he leaves his laboratory after a bad day's work to get a bite to eat. When he returns, it is only to find that he left the power on, connected to his experiment. The circuitry has overheated, and caused his generators to fail, sending massive power surges throughout the laboratory. This has caused a fire to break out, and if that wasn't enough, it has somehow caused all his chemical apparatus to come alive!

But, all is not lost for Hilfe. For the main pieces of his pride and joy, Frankie his robot, are still intact, although scattered around. If he could just manage to carry each piece, one, a time to Frankie's bed then his life's work might be saved. But will it all end there? You have to guide Professor Hilfe around his laboratory, avoiding Barmy Bunsens, Crazy Conicals, Terrible Test-tubes and the like, taking one part of Frankie at a time to his bed.

I have written a special loader for typing in the hex codes, which are extensively check-summed. Another problem created in the writing of this program, is that the code isn't all in one place. In fact roughly two-thirds of it is above RAMtop, and the rest below: 3K in a Rem line and a further 118 bytes crammed into the printer buffer. For this reason, we will have to modify the hex loader twice to put the code in place.

So, first things first. It is best to have at least one totally blank short tape on which to put the finished product, and another on which to store the hexloaders and half-finished efforts. I shall now detail the procedure step by step:

SIMPLEX

1. Type in the loader program for the finished game, but don't run it. Save this at the beginning of your blank tape, using

SAVE "ALIQUID" LINE 1

2. New the computer, type

CLEAR 26969

and enter the first version of the hexloader. Save this on another tape.

3. Now start typing in the main bulk of the machine code, from Dump 1. If at any time you wish to stop and start again later, type 5 and then save the program on the other, non-finalised tape. Enter the hex digits one row at a time with no spaces, checksum included. The listing format will be the same as it is here. If at any time a checksum doesn't correspond to the total modulus 256 of the eight other bytes entered, a Beep will sound, and you will get the same prompt address to enter that row again.

Loader program for finished games.

```
  10 BORDER 0: PAPER 0: INK 0: C
LEAR 26970: PRINT INK 7; AT 10,1
"CODE:(7 DIGITS)": INPUT "CODE:"
;AT 8,10; INK 6;"PLEASE WAIT";AT
0,0: LOAD ""CODE : LOAD ""CODE
: LOAD ""

The hexloader.

   5 DEF FN H(H$)=16*(CODE H$(1)
-48-(7 AND H$(1)>"9"))+CODE H$(2
)-48-(7 AND H$(2)>"9")
  10 FOR N=26970 TO 32767 STEP 8
  12 PRINT N; : LET C=0: POKE 236
56,8 : INPUT LINE H$
  14 IF H$="S" THEN GO TO 100
  16 IF H$="E" THEN STOP
  20 IF LEN H$<18 THEN PRINT "
ERROR": BEEP .1,-10: GO TO 12
  22 FOR M=0 TO 7
  24 POKE N+M,FN H(H$(M*2+1 TO M
*2+2)): LET C=C+PEEK (N+M)
  26 PRINT " ";H$(M*2+1 TO M*2+2
);
  28 NEXT M
  30 IF FN H(H$(17 TO 18))=C-256
*INT (C/256) THEN PRINT "=";H$(1
7 TO 18): NEXT N: PRINT "O.K.!
": STOP
  32 PRINT "ERROR": BEEP .1,0:
GO TO 12
 100 SAVE "SO FAR" LINE 120: SAV
E "AS CODE SO FAR"CODE 26970,N-2
6969
 110 PRINT "SAVED...": STOP
 120 RANDOMIZE N: CLEAR 26969: L
OAD ""CODE : LET N=PEEK 23670+25
6*PEEK 23671: CLS : GO TO 12

The Rem creator.

  10 FOR N=32600 TO 32644: READ
A: POKE N,A: NEXT N: RANDOMIZE U
SR 32600: PRINT " NO: DELETE ?N
ES/NO:CHK ON"
 100 DATA 33,202,92,1,145,11,205
,85,22,33,203,92,34,83,92,54,0,3
5,54,1,35,54,111,35,54,11,35,54,
203,1,138,11,30,68,35,115,11,120
,177,32,249,35,54,13,201
```

4. Once you have finished this, the loader will end, and you can save the resultant code after the loader program on the finalised tape:

SAVE "MC"CODE 26970,5798

5. Now edit the following lines of the hex-loader and change them to:

```
 10 FOR N=23363 TO 23481 STEP 8
100 SAVE "SO FAR" LINE 120 :
    SAVE"XDAT"CODE 23363,118
120 RANDOMISE N: LOAD""CODE :
    GOTO 12
```

6. Run the hexloader again, and enter the data from Dump 2, the printer buffer data. When this is all correct, type:

SAVE "XDAT"CODE 23363, 118

and record on to the finalised tape.

7. Next, edit the hexloader again:

```
 10 FOR N=29800 to 32755
100 SAVE "AS SO FAR"CODE 29800,
    N-29799
120 RANDOMISE N : CLEAR 29799 : LOAD
    ""CODE: LETN=PEEK
    23670+256*PEEK
    23671: CLS: GOTO 12
```

8. Now type as a direct command

CLEAR 29799: RUN

and enter the codes from Dump 3, once again use S to save a partly finished version.

9. After you have finished this, do not save it on the finalised tape but the other one, and with:

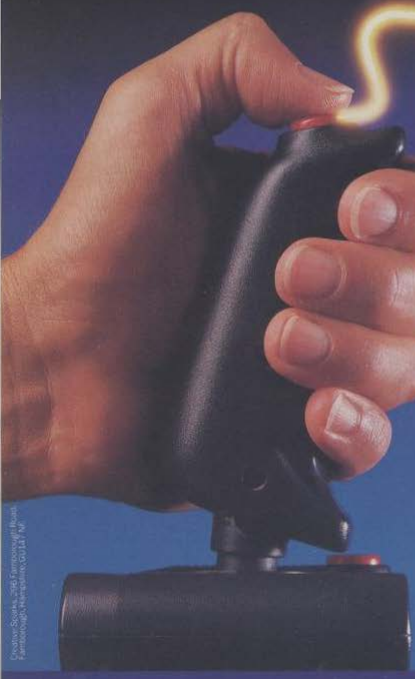
SAVE"REMLINE"CODE 29800,2955

10. Now pull out the plug or otherwise clear the computer, and type in the Rem creator program; take care with the machine code in

(continued on page 87)

QUALITY CONTROL FROM CREATIVE SPARKS ON C64

For those who demand excellence



JAVA JIM

Guide Java Jim around the screen digging near square holes as he searches for ancient relics. You will have to avoid the lumps of sizzling lava being continually showered down on Jim from the still active volcano in this highly original fun game.

4 full graphic all action screens.
20 levels of play.
High score feature.
Fast loading cassette.

COUNTDOWN TO MELTDOWN

An amazing graphic action adventure game which puts you in charge of a team of androids trying to reach the core of a nuclear reactor before it explodes.

This game has over 2000 rooms to be negotiated and every single one of them is in 3D!!

Probably the most exciting game yet developed for the C-64.

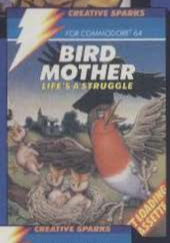
Fast loading cassette.

BIRD MOTHER

This is a delightfully original game which uses nature as the setting for a highly compelling and challenging game. Guide the Bird Mother as she builds her nest and raises her young, finally protecting them from a predator hawk.

Fast loading cassette.

The stunning graphics and music in Bird Mother are not to be missed.

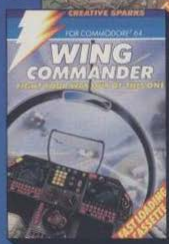


WING COMMANDER

This is a highly sophisticated flight combat simulator which puts you in the pilots seat. Highly advanced machine code programming has ensured you feel every stomach lurching dive and roll.

With 17 separate controls to be monitored and several ground targets to be defended from the attacking enemy bombers. This game will stretch your skills to their limits.

Fast loading cassette.



Creative Sparks, 296 Farnborough Road, Farnborough, Hampshire, GU14 7NF

CREATIVE SPARKS

Available from All good computer software stockists.

Send me (tick as required)

- ☐ **JAVA JIM** TNCE163 (C64) **£7.95**
- ☐ **COUNTDOWN TO MELTDOWN** TNCE273 (C64) **£7.95**
- ☐ **BIRD MOTHER** TNCE263 (C64) **£7.95**
- ☐ **WING COMMANDER** TNCE203 (C64) **£7.95**
- ☐ My local stockist's address
- ☐ Your full list of games

	£	:	p
Game/s at £7.95 each			
+ single P&P sum		:	30p
Total to send	£	:	p

Method of payment
By cheque or PO (no cash) made payable to **TECS**

☐ By Access

or

Enter card no. ☐ Barclaycard

Sign below:

Credit card sales: UK buyers only.
Response within 21 days.

Creative Sparks,
Department MO,
296 Farnborough Road,
Farnborough, Hampshire, GU14 7NF.
Telephone: (0252) 518364.

Name

Address

YC1184

(continued from page 85)

the Data at line 1000 as it isn't checksummed. Run this, then delete 100 and then 10. You should now be shown the long Rem at line 1 the machine has created — just to save you some typing! Try to avoid pressing Enter now or after reports as you'll have to sit through the listing again. Type:

LOAD "REMLINE" CODE 23760

and reload the data you save earlier from Dump 3. The Rem will now not list properly, and should have 1 Rem Dacode at the top. Type line 10 in, as below:

10 RANDOMISE USR 23762

and now save the completed program on the finalised tape after 'Xdar', using:

SAVE "ALL. MAIN" LINE 10

11. Now clear the computer, rewind the tape and test it all.

If anyone who does not fancy typing in the program would like a tape of it, I can supply them at £3 each so long as you write your address clearly, from 16 Viking Way, Pilgrims Hatch, Brentwood, Essex, CM15 9HX.

Dump 2.

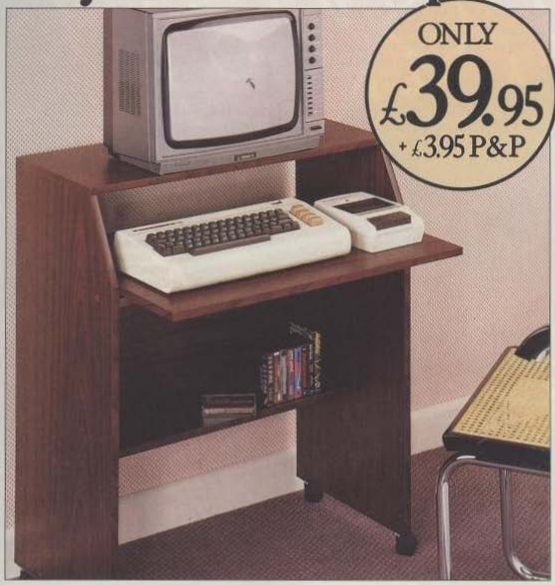
Dump 1.

(continued on next page)

(continued from previous page)

Dump 3.

At last the ideal home for your home computer.



Now you can house your total computer system, video or hi-fi in superb style with these three elegant and practical cabinets. No more clutter. No trailing wires. And better protection for your valuable units.

And although you might expect beautiful furniture of this quality to cost the earth, the price is only £39.95 each (plus £3.95 p+p).

FURNITURE THAT WILL ENHANCE YOUR HOME

Each of these fine units is British made and finished by craftsmen in either a rich mahogany or stylish teak look. Beautiful surfaces that are heat resistant, scuff resistant. And assembly couldn't be easier. In minutes you'll create classically stylish furniture that will last for years.

SAVE UP TO £7.90 IF YOU BUY 2 OR MORE UNITS

Order more than one of these fine units and you need only pay a total of £3.95 for postage and packing. If you buy all three you could save £7.90. Simply fill in the coupon and send today.

THE MOBILE COMPUTER DESK

Hardware, software, here's somewhere for it all, right at your fingertips.

For your TV or monitor, a rigid, wide desk top with room for a telephone and modem beside it.

Beneath it there's a large shelf for your keyboard, disk drives or cassette recorder. A surface that smoothly slides away when you've finished computing.

Within the body of the desk another shelf stores your tapes, disks, joysticks, books, manuals and magazines. And rounding it off nicely are four smoothly running castors for easy mobility.

DON'T MISS THIS UNIQUE OPPORTUNITY

To order simply fill in the coupon. We'll despatch your furniture within 3 working days of receipt of order. Allow 28 days for delivery.

THE NATIONAL NEWSPAPER MOPS MAIL ORDER PROTECTION SCHEME

24 HOUR TELEPHONE ORDERING

Credit Card holders can order simply by ringing Leeds (0532) 776260 at any time day or night 7 days a week.

THE CLASSIC GUARANTEE

All products are guaranteed against defects in materials and manufacture for 12 months and if for any reason you're dissatisfied with the goods simply return them to us unused within 30 days and we will refund the purchase price in full. This guarantee in no way affects your legal rights.

And some neat ideas for your video & hi-fi too.

THE SLIMLINE VIDEO UNIT

This ingenious cabinet houses both your TV and video in perfect harmony, whatever their dimensions. The handsome smoked glass doors with magnetic catches help keep dust off sensitive video equipment and there is a deep brassed handled drawer where you can securely lock away your video cassettes. Four gliding castors create total manoeuvreability.

A stunningly attractive unit at a stunningly attractive price. Order now in Teak or Mahogany finish.

THE STACKING HI-FI CABINET

The functional yet beautiful answer to a room swamped with wires and separate hi-fi units.

Here's how it all stacks up.

A smooth, even surface for your turntable. Beneath it behind an elegant smoked glass door, two deep shelves, one adjustable, for your amplifier, tuner or cassette deck.

At the base a storage section with brassed dividers to keep your collection in mint condition.

Order your unit in stylish Teak or rich Mahogany finish.

Approximate dimensions: Hi-Fi Unit – Width 500mm Depth 430mm Height (inc. rubber feet) 900mm. Computer Desk – Width 700mm Max. Depth 380mm Height (inc. castors) 840mm. Video Unit – Width 720mm Depth 415mm Height (inc. castors) 510mm

Classic Mail Order

W.A. Smith (Leeds) Ltd., T/A Classic Mail Order, Lowfields Way, Leeds LS12 6HQ

Please post to Classic Mail Order, Lowfields Way, Leeds LS12 6HQ.
Please send me (fill in box(es) with number(s) required).

			QTY REQ	PRICE	SUB TOTAL
COMPUTER DESK	CL601	Teak		£39.95	
	CL602	Mahogany		£39.95	
VIDEO CABINET	CL603	Teak		£39.95	
	CL604	Mahogany		£39.95	
Hi-Fi CABINET	CL605	Teak		£39.95	
	CL606	Mahogany		£39.95	

Postage & Packaging £3.95
TOTAL

I enclose a cheque/postal order for £ _____ made payable to Classic Mail Order or please debit my Access/Visa/Diners/American Express Card

No. _____

Signature _____

Name _____
(BLOCK LETTERS PLEASE)

Address _____
(BLOCK LETTERS PLEASE)

_____

_____ Postcode _____

Remittance should be made payable to Classic Mail Order. YC11

Please allow 28 days for delivery.

All prices incl. VAT. Delivery subject to availability. UK only (excluding C.I.)

Classic Mail Order. Registered office: Lowfields Way, Leeds LS12 6HQ. Registered number 1530897.

WIN £25,000 AND SAVE THE WORLD

Eureka!™

250 K OF PURE MYSTERY BY IAN LIVINGSTONE

■ 5 complete Adventures, each with its own Arcade, in one multi-load mega-program. "Eureka!" is *the* ultimate computer Epic.
■ Epic in scale: "Eureka!" spans five eras of history! You battle against the dinosaurs, outwit Nero and his gladiators, join the Knights of the Round Table, escape from Colditz, and finally into 1984 defeat the evil master of the Caribbean who is holding the world to ransom.
■ Epic in sheer size — there's more than 250K for you to get yourself killed in.

Spectrum 48K or Commodore 64 (Turboload)

Full-colour booklet, packed with cryptic clues to help you unravel the mystery — and win the £25,000 reward

Music and sound effects built in

5 PROGRAMS IN ONE

■ All 5 Adventures are linked — but you can choose to play them separately. And they all have REAL TIME built in. So if you don't think fast, you wind up as a pterodactyl's lunch, die of over-exertion in a Roman orgy, or just lose your mind...
■ "Eureka!" is not just an Epic — not just an Adventure. At the start of each historical era, you face an Arcade Action test, to decide your strength level for the Adventure to come.
■ The better your score, the stronger and faster you'll be.
■ And it'll keep you on your toes, with constantly-changing, static and moving graphics. Brilliant music and sound effects add to the excitement.
■ As part of the "Eureka!" pack, you receive a full-colour illustrated booklet, containing cryptic riddles and mysterious illustrations. Using booklet and screen *together*, you steadily unravel the clues and build up a secret phone number piece by piece.
■ If you're first to ring it, you save the world and collect the £25,000!
■ Quite a package! And to give everyone a fair chance, "Eureka!" will be released simultaneously worldwide on October 31st, 1984. No packs will be available until that date. All orders received by mail or phone by 26th OCTOBER will be despatched by post on the 31st right across the world. So order now, and be one of the first off the mark.

High quality, full-colour, static and moving graphics

Just clip the coupon. Or, for even faster action, order by Credit Card on the "Eureka!" Telephone Hotline 01-460 6000.

THEN THE RACE IS ON!!!

DEVISED BY IAN LIVINGSTONE

The storylines for "Eureka!" are by Ian Livingstone, whose "Fighting Fantasy" books have sold over 2,000,000 copies. He's dreamed up some rather nasty tricks and twists for you in this Epic, because he has also devised the cryptic clues and conundrums in the booklet that goes with the program. He's the one who knows the answers.

"Eureka!" was programmed by Andromeda teams led by Hungarians Donat Kiss and András Csaszar. It took the equivalent of 5 YEARS to create, and the skills of 4 graphic artists, 2 musicians and a professor of logic too. We told them to stretch the hardware's capabilities, and make sure you were kept awake for hours!! They've done it...

£7 BONUS

When you order "EUREKA!" before 26 OCTOBER 1984, you receive an additional bonus: £7 voucher off the price of the **TROJAN LIGHT PEN** from PSL MICROTECH. Normal price is £17.25. You buy it for just £10.25.

Send your order now to:
"Eureka!", FREEPOST, Dept 400, Mount Farm, Milton Keynes, MK1 1HQ

NO STAMP NEEDED

To: "Eureka!", FREEPOST, Dept 400, Mount Farm, Milton Keynes, MK1 1HQ

DOMARK

Please send me "Eureka!" packs, complete with cassette, full-colour booklet, instructions and rules, at **£14.95** each PLUS 55p post & packing. If my order is received before 26 October 1984, I will receive a free £7 voucher towards a Trojan light pen. Please allow 14 days delivery for orders received after 26 October.

MY COMPUTER IS	QUANTITY	Total at £ 15.50
COMMODORE 64		
SPECTRUM 48K		
	TOTAL £	

24 HOUR PHONE HOTLINE NUMBER
01-460 6000
For Credit Card Orders

I enclose payment by cheque/PO, payable to DOMARK LTD.
OR Please charge my Credit Card VISA ☐ ACCESS ☐ AMEX ☐
Card Number
Expiry Date ____ Date ____
Name ____ Signature ____
Street ____
Town ____ Post Code ____ YC

The race for the £25,000 starts on 31 Oct 1984 and closes on 31 Dec 1985.

Domark Ltd., 228 Munster Road, London SW6. Reg. No: 1804186 (England).

GUNNER

Hit those planes before their air-to-ground missiles hit you in Tim Humphries BBC game.

THE OBJECT of Gunner is to stop the planes from passing over, towards their destination which is your local city.

You may rotate the gun 360 degrees to scan for the enemy planes which come screaming towards you in a 3D perspective form. When they are visible you must shoot them down with your gun sights which could be difficult, as they swerve and sweep and have a few pot shots at you as they go.

Unfortunately your guns can only withstand three hits resulting in destruction or, if you let 10 planes pass, you are retired from your position due to total destruction of your city.

```
  10REM #### By Tim Humphries 1984 ####
  20TX=RND(-3):HSX=500
  30ENVELOPE1,3,0,0,0,0,0,0,121,-10,-5,-2,120,120
  40ENVELOPE2,133,0,-1,-10,0,0,121,-10,-10,-8,126,0
  50VDU23,240,128,192,160,144,156,167,196,255,23,241,7,12,20,39,228,148,140,255
,23,248,16,16,16,254,16,16,16,0,23,254,60,126,255,255,255,255,126,60
  60VDU23,250,0,0,0,48,48,48,48,0,23,255,255,255,255,255,255,255,255,255,23,245
,0,0,0,16,56,254,255,255,23,246,0,0,0,56,60,127,255,255,23,247,0,0,0,0,0,255,255
,255
  70VDU23,253,0,0,0,0,0,0,24,24,23,234,0,0,0,0,24,60,60,60,23,235,0,0,0,24,60,6
0,126,60,23,236,0,0,56,124,56,124,254,124,23,237,0,60,126,126,60,126,255,126,23,
238,60,126,126,60,126,255,255,126
  80FOR%=250TO252:VDU23,%,RND(255),RND(255),RND(255),RND(255),RND(255),RND(25
5),RND(255),RND(255):NEXT
  90DIM CX%(30),CY%(30),AL%(4):FORX%=0TO30:CX%(X%)=14*30*COS(X%/15*PI):CY%(X%)=1
30*SIN(X%/15*PI):NEXT
  100MODE7:VDU23;8202;0;0;0;:FORIX=0TO1:PRINTTAB(0,IX);CHR$141;CHR$132;CHR$157;B
PC13;CHR$131;"GUNNER":NEXT
  110PRINTTAB(0,23);CHR$129;CHR$157;CHR$135;" By Tim Humphries";TAB(24);"Copyri
ght 1984"
  120PRINTTAB(5,4);CHR$130;"Keys :";TAB(6,7);CHR$129;"LEFT";CHR$131;" - "Z"";T
AB(6,9);CHR$129;"RIGHT";CHR$131;" - "X"";TAB(6,11);CHR$129;"UP";CHR$131;" -
"K";TAB(6,13);CHR$129;"DOWN";CHR$131;" - "M";TAB(6,15);CHR$129;"FIRE";
  130PRINTCHR$131;" - "RETURN";TAB(5,18);CHR$130;"OR Joystick";TAB(0,22);CHR$
132;CHR$157;BPC2;CHR$136;CHR$135;"PRESS SPACE OR FIRE TO START";PROCk;
  140MODE2:VDU23;8202;0;0;0;0;
  150VDU19,0,4;0;19,15;0;0;19,13;0;0;19,14,4;0;19,5,7;0;
  160GCOL0,2:MOVE0,0:MOVE1279,0:PLOTB5,0,600:PLOTB5,1279,600:GCOL0,4:MOVE0,605:D
RAW1279,605
  170B$=STRING$(20,CHR$247)
  180FORQ%=0TO2:B$=B$+CHR$(244+RND(3)):NEXT
  190B$=B$+CHR$(241+CHR$240+CHR$241+CHR$240:BG%=10:FORX%=0TO20:B$=B$+CHR$(244+RND
(3)):NEXT:B$=B$+CHR$(241+CHR$240,CHR$247)
  200TX=700:ST%=0:HTX=2:PLX%=0:PROCcrs
  210PROCisc
  220GCOL0,1:FORJX=0TO20:MOVE&79,0+MOVE&79+&80*COS(JX/20*PI),0+200*SIN(JX/20*PI)
:PLOTB5,&79+&80*COS((JX+1)/20*PI),0+200*SIN((JX+1)/20*PI):NEXT
  230FORIX%=0TO12:VDU19,IX,1;:NEXT:VDU19,9,4;0;
  240CX=9:FORJX%=0TO70:GCOL0,CX:MOVE&79,0:DRAW&79+&80*COS(JX%/70*PI),0+200*SIN(JX/
70*PI):CX=CX+1:IFCX=15 CX=9
  250NEXT
  260CX=9
  270GCOL0,4:MOVE300,0:MOVE350,300:PLOTB5,979,0:PLOTB5,929,300:MOVE500,300:MOVE5
20,450:PLOTB5,560,300:PLOTB5,570,450:MOVE780,300:MOVE756,450:PLOTB5,720,300:PLOT
B5,710,450:GCOL0,13:MOVE300,0:DRAW350,300:DRAW929,300:DRAW979,0
  280MOVE720,0:DRAW&80,140:DRAW700,140:DRAW710,0
  290MOVE430,0:DRAW&80,300:MOVE&49,0:DRAW&19,300:GCOL0,4:MOVE460,0:MOVE470,150:P
LOTB5,550,0:PLOTB5,550,150:MOVE&20,0:MOVE&10,150:PLOTB5,740,0:PLOTB5,740,150
  300GCOL0,3:MOVE480,150:VDU5,254,4:MOVE750,120:VDU5,254,4:GCOL0,13:MOVE500,110:
DRAW500,80:MOVE770,110:DRAW770,80:GCOLB$:PRINTTAB(15,0);HS% - - - - -
  310AL(0)=0:AL(1)=15:AL(2)=B:AL(3)=21:AL(4)=24:CP%=250:FORN%=RND(40%):X%=X%-140&:
Y%=&20+RND(200):J=0:G=0:RX=0:E%=0:MS%=
  320SOUND1,-15,150,1:FORI%=0TO50:NEXT:SOUND1,-15,150,1
  330COLOUR14:PRINTTAB(8,18);:VDU255,9,9,255
  340PROCplane
  350COLOUR13
  360REPEAT
  370IFMT%:GPROCend:PROCh;sc:GOTO270
  380PROCplane
  390IFEX=1PROCspin:GOTO450
  400J=J+G:G=G-.005
  410IFRND(10)+5%>RND(3)-2:FORD%=0TO4:AL(D%)=AL(D%)-RX:NEXT
  420Y%=Y%-(B%*(&20)):YY=Y%+(&&3)
  430SOUND&14,-(J&4),98,10
  440IFJ:2IFRND(10)=2PROCp+
  450FDRQX=0TO4:IFAL(QX)>29%AL(QX)=0
  460IFAL(QX)<0&%(QX)=29
  470NEXT
  480IFJ%>1PROCpi;sGOTO530
  490IFINKEY-98 X%=X%+&4:BG%=BG%-1:PROCisc:CX=CX-1
  500IFINKEY-67X%=X%-&4:BG%=BG%+1:PROCisc:CX=CX+1
  510IFINKEY-73ANDT%<1040PROCcrs:T%=T%+1&:PROCcrs
  520IFINKEY-105ANDT%>670PROCcrs:T%=T%-1&:PROCcrs
  530IFEX:12 CX=9:VDU19,12,1;0;ELSEIFCX<9CX=12:VDU19,9,1;0;
  540VDU19,CX,4;0;19,CX-1,1;0;:IFCX=1:CX=VDU19,CX+1,1;0;ELSEVDU19,13,0;0;
  550IFX:-1+&0X%=&BBELSEIFX%:248X%=-1&&
  560IFX%>0ANDX%<1279ANDMS%<>0COLOUR1:PRINTTAB(0,0);"IN RANGE":MS=0
  570IFX%<0ANDMS%-1COLOUR3:PRINTTAB(0,0);"TO LEFT ":MS=-1
  580IFX%>1279ANDMS%>1COLOUR3:PRINTTAB(0,0);"TO RIGHT":MS=1
  590PROCplane
  600IFJSX=1AND(ADVAL(0)AND1)=1PROCf+ ELSEIFINKEY-74PROCf+
  610IFEX=2PROCplane:SOUND0,-15,100,50:SCOL3,1:FORX%=0TO200:MOVEX%,Y%:VDU5,(229+
RND(3)),4:NEXT:SCOL0,2:MOVEX%,Y%:VDU5,255,4:Y%=2000:X%=4000
  620GOTIL%:X%=100
  630#X15,0
  640IFY%<2000PL%=PL%+1:FORK%=-12TO:SOUND0,K%,98,2:NEXT:COLOUR1:PRINTTAB(0,0);P
L%;" PLANES":A%=INKEY(200):IFPL%>10PROCend:PROCh;sc:GOTO270
  650PROCplane
  660GOTO310
  670DEFPROC,s
  680JQX=ADVAL(1)/65520*10:JRX=ADVAL(2)/65520*10
  690IFJQX>7TX=TX+&4:BG%=BG%-1:PROCisc:CX=CX-1
  700IFJRX>7TX=TX-&4:BG%=BG%+1:PROCisc:CX=CX+1
  710IFJRX<3ANDT%<670PROCcrs:T%=T%-1&:PROCcrs
  720IFJRX>7ANDT%<1023PROCcrs:T%=T%+1&:PROCcrs
  730ENDPROC
  740DEFPROCplane
  750GCOL3,15:MOVEX%+CX%(AL(0))&2,Y%+CY%(AL(0))&3:DRAWX%+CX%(AL(1))&3,Y%+CY%(AL(
1))&2:MOVEX%,Y%:DRAWX%+CX%(AL(2))&3/2,Y%+CY%(AL(2))&2/2:ENDPROC
  760DEFPROCisc
  770COLOUR2
  780IFBG%(1BG%=&5ELSEIFBG%)&5BG%=1
  790PRINTTAB(0,12);MID$(B$,BG%,20)
  800ENDPROC
  810DEFPROCcrs
  820GCOL3,7:MOVE&20,T%:VDU5,248,4:ENDPROC
  830DEFPROCfr
  840#FX21,4
  850VDU19,14,2;0;:SCOL3,7:SOUND0,2,102,2:FORIX=0TO1:MOVE540,450:DRAW&40,TX-20:D
RAW740,450:NEXT:VDU19,14,4;0;:PNX=POINT(639,TX-20):IFPNX=130R PNX=15PROCexp
  860ENDPROC
  870DEFPROCexp
  880#FX15,0
  890SX=&X+(150-(JX%0)):COLOUR1:PRINTTAB(9,0);$X:SOUND0,-15,100,5:EX=1:SP%=RND(4
)):IFX%<&39XX%=-20ELSEXX%=20
  900GOSUB100
  910ENDPROC
  920DEFPROCspin
  930FORQX=0TO2:AL(QX)=AL(QX)+SP%:NEXT:Y%=Y%-20
  940IFY%<(590-(JX20):EX=2:#FX15,0
  950SOUND&13,-10,&%0,10:SNX=BN%-1
  960X%=X%+XX%:ENDPROC
  970DEFPROCp4
  980FX=X%+CX%(AL(3))&(JX7):GX=Y%+CY%(AL(3))&(JX7):HX=X%+CX%(AL(4))&(JX7):IX=Y%+
CY%(AL(4))&(JX7)
  990#FX21,4
  1000GCOL3,1:SOUND0,1,100,1:FORIX=0TO1:MOVE FX,SX:DRAW XX,Y%:DRAWHX,IX:NEXT
  1010IFPOINT(FX,SX)!4MOVEFX,GX:PROChit(0)
  1020IFPOINT(HX,IX)!4MOVEHX,IX:PROChit(1)
  1030ENDPROC
  1040DEFPROCend
  1050#FX15,0
  1060SOUND0,-15,100,20:COLOUR1
  1070PROCplane:PRINTTAB(0,0);SPC19
  1080ENDPROC
  1090DEFPROChit(HX)
  1100GCOL0,2
  1110IFHX>0IFSX>2006GCOL0,ELSEIFHX:1FIX:2006GCOL0,1
  1120VDU19,4,2;0;:FORQX=0TO10:VDU19,4,1;0;19,4,4;0;:NEXT:HT%=HT%-1:ENDPROC
  1130DEFPROCisc
  1140GCOL0,4:MOVE0,&40:MOVE1279,&40:PLOTB5,0,1023:PLOTB5,1279,1023
  1150IF$%<HEXPRINTTAB(16,10);"THE END":PROCh;:PRINTTAB(6,10);SPC8;TX=700:BZ=0:HT%
=2:PLX%=0:PROCcrs:ENDPROC
  1160WS%=WS
  1170FORH%=0TO10:PROCfr:NEXT
  1180VDU5:GCOL0,1:MOVE&40,900:PRINT"CONGRATULATIONS":MOVE240,850:PRINT"YOU NOW
HOLD":MOVE190,800:PRINT"THE HIGH SCORE"
  1190T%=700:SX=0:HT%=2
  1200#FX15,0
  1210FORHX:1;GCOL0,0:MOVE0,&40:MOVE1279,&40:PLOTB5,0,1023:PLOTB5,1279,1023
  1220DEFPROCk;
  1230REPEAT:SX=(ADVAL(0)AND1):UNTIL$%=IOR INKEY-99:ENDPROC
```

YOU MARVELLED AT BEACH-HEAD...

NOW ACCESS PRESENT THEIR LATEST MASTERPIECE:

RAID OVER MOSCOW

commodore 64

The most breathtaking 3-D graphics yet seen on the Commodore 64!

Gripping arcade action

Multiple scrolling screens

The Soviets launch a nuclear strike against major cities in the United States and Canada. With our own nuclear arsenal dismantled, in accordance with the Salt IV Arms Agreement, the Soviets believe their treachery will lead to total world domination. Our only hope is our space station equipped with stealth bombers, which can fly undetected in Soviet airspace.

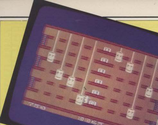
As squadron leader, you must lead your commandos on a virtual suicide mission, knock out the Soviet launch sites, and then proceed into the city of Moscow. Armed with only the weapons you can carry, you must seek and destroy the Soviet defence centre to stop the attack! Top multi-screen action!

Available on CASSETTE £9·95 DISK £12·95

U.S. GOLD
All American Software

U.S. Gold is stocked by all leading computer stores including:
BOOTS WH SMITH JOHN MENZIES
WILDINGS WOOLWORTH

Dealers! For information on how to become a U.S. Gold Stockist write to: CentreSoft, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020. Telex: 337268.



ELEVATORS

H. Kaljouw gives your Vic a little lift

VIC

ELEVATORS IS A GAME of skill written for the unexpanded Vic-20. The elevators have run amok in a huge building. They have to be switched off but there is one problem, the main switch is on the top floor of the building. The elevators are useless so you will have to use the stairs.

So far it looks easy but there are a few problems. First of all you have to dodge the eight elevators, which is pretty tough in itself, and secondly you have a time limit to cross each floor. If you get hit by an elevator or if you pass the time limit you are dead, and you have to start at the ground level again. At the start of the game the time limit is 15 seconds. If you manage to reach the top of the building the time limit decreases by 2.5 seconds. You have three lives.

There is a bonus to be found in the middle of each floor, except for the ground level. Each bonus is numbered from one to four. When you walk through a bonus, it is automatically replaced by another one which is worth a further 100 points. The highest bonus is worth 400 points.

Each time you cross a floor safely, you automatically go to the next floor. You get 500 points plus extra points depending on the time you have left. When you have crossed the top floor safely you get 4,000 points. Then you have to start at the ground level again. The time limit goes down by 2.5 seconds.

Elevators uses machine code and 25 user-defined characters. To make the game fit in the unexpanded Vic I had to write it in three parts, and even then there was no space left to add Rem statements.

Program 1 contains the data for the machine code and the user-defined characters. There are checksums for both. If you have typed in a wrong number the program will end with an error message. After program 1 is run it automatically loads and runs the second program.

Program 2 gives you the title screen, instructions and the scoretable. It also tells you which key to use — "," = left and "." = right. After program 2 is run, it is also auto-

(continued on page 95)

Program 3.

```
1 REM * ELEVATORS 3 *
2 REM
3 POKE36879,142:PRINT"[CLR]":POKE36869,255:POKE36878,10:POKE7160,184:POKE7161,11
4 HI=PEEK(7160)+256*PEEK(7161)
5 GOSUB900
10 P=8120:X=0:SC=0:R=0:V1=32:V2=32:W=0:N=3:F=60
15 F=60:TI$="000000"
20 GOTO100
30 SYS7137
40 GOTO575
100 O1=PEEK(203):IFO1<>37ANDO1<>29THEN110
105 R=-1:IFO1=37THENR=1
110 IFX=0ANDR=-1THENR=0:GOTO160
115 IFX=20ANDR=1THENR=0:GOTO160
117 IFR=0THENFORR=1TO70:NEXT:GOTO160
118 O1=PEEK(P):O2=PEEK(P-22):IFO1<30ORO1>59THENV1=O1:V2=O2:GOTO600
119 IFO2<30ORO2>59THENV1=O1:V2=O2:GOTO600
120 O1=PEEK(P+R):O2=PEEK(P+R-22)
121 POKE36875,200:POKE36875,0
125 IFO1>37ANDO1<42THEN800
130 IFO1=32ANDO2=32THEN150
135 IFO1=33ANDO2=33THEN150
140 IFO1=30ANDO2=30THEN700
145 GOTO600
150 POKEP,V1:POKEP-22,V2:P=P+R:X=X+R
155 V1=O1:V2=O2
160 POKEP,45+2*R:POKEP-22,44+2*R:POKEP+30720,1:POKEP+30698,1
165 GOTO30
500 FORA=1TO130:POKE36879,132:POKE36876,255-A:FORB=1TO13:NEXT:POKE36879,140:NEXT
510 POKE36877,0:W=4000:GOSUB850:POKEP,30:POKEP+30720,6:POKEP-22,30:POKEP+30698,6
:P=8120
515 FORA=7734TO8064STEP66:POKEA,38:POKEA+30720,1:NEXT
520 X=0:R=0:V1=32:V2=32:TI$="000000":F=F-10:GOTO160
575 K=INT(TI/F):IFK=0THEN586
582 POKE7832+K*22,27:IFK>1THENPOKE7811+K*22,37
585 IFK>14THEN600
586 GOTO20
600 N=N-1:POKE36877,220:FORL=15TO1STEP-1:POKE36879,L:FORM=1TO77:NEXT:NEXT:POKE36
877,0
610 POKE36878,10:IFN=0THEN650
620 POKEP,V1:POKEP-22,V2:FORA=1TON-1:POKE8185-A,44:NEXT:POKE8185-A,32:TI$="00000
0"
625 IFN=1THENPOKE8184,32
630 FORA=7855TO8162STEP22:POKEA,36:NEXT:P=8120:X=0:V1=32:V2=32:P=0:GOTO160
650 PRINT"[CONTROL CHARACTERS]GAME OVER":PRINT"[CONTROL CHARACTERS]PLAY AGAIN Y/N":POKE7161,INT
(HI/256)
655 POKE7160,(HI-PEEK(7161)*256):GETA$
657 IFA$="Y"THENCLR:GOTO4
660 IFA$="N"THENPRINT"[CLR]":POKE36869,240:END
665 GOTO655
700 POKEP,32:POKEP-22,32:P=P+R:X=X+R:POKEP,45:POKEP-22,44:POKEP+30720,1:POKEP+30
698,1
727 IFP=7744THEN500
730 FORA=PTOP-44STEP-22:POKEA,30:POKEA+30720,6:POKEA-22,45:POKEA+30698,1:POKEA-4
4,44
740 POKEA+30676,1:NEXTA:FORB=60TO1STEP-8:FORY=192-BTO192+BSTEP4:POKE36876,Y
760 NEXTY,B:W=500+INT(15-K)*15:GOSUB850:P=P-66:R=0:V1=32:V2=32:TI$="000000"
770 FORA=7855TO8163STEP22:POKEA,36:NEXT:GOTO160
800 POKEP,V1:POKEP-22,V2:P=P+R:X=X+R:W=(O1-37)*100:V1=O1+1:V2=32:IFO1=41THENV1=3
2
830 GOSUB850:GOTO160
850 SC=SC+W-20*INT(W/20)
855 FORT=1TOW/20
860 SC=SC+20:IFSC>HITHENHI=SC
865 PRINT"[CONTROL CHARACTERS]"SC:TAB(8);HI"[CONTROL CHARACTER]"
870 POKE36876,230:POKE36876,250:POKE36876,0
875 FORD1=1TO5:NEXT
880 NEXTT
```

(program 3 continued on page 95)

MODEM.

HIGH-SPEED COMPUTER TALK FROM PROTEK

Inter-computer communication is easy in anyone's language, thanks to the Protek Modem. Acoustic coupling provides a reliable link between the computer and the telephone line. There are no connection charges, the unit is totally portable. The flexible link between the mouth and ear-pieces ensures a reliable connection between most telephones.

For £59.95

Interface Packs including software are available for the following computers:—

- ZX Spectrum 48K £24.95
- BBC Model'B'Micro £14.95
- CBM 64 £14.95
- Oric Atmos 48K £24.95 (available September)
- Electron £24.95 (available September)

Features include:

- Two operating modes 1200/1200:1200/75
- Battery powered
- Totally portable
- LED Indicator
- Compatible with any standard RS 232 Interface

British Telecom Approved

Protek

Protek Computing Ltd, 1A Young Square, Brucefield Industrial Park, Livingston, West Lothian. 0506 415353.

(continued from page 93)

matically loads and runs the next program.

Program 3 is the main program. The little man is controlled by Basic, the elevators by machine code. At first the man is stationary. When you press "." he starts walking to the right.

Once the man has started walking, he cannot be stopped. The only way to protect him from being hit by an elevator is by making him walk back by pressing the ",". This makes dodging elevators very hard. Program 3 also keeps a high score which is 3,000 at the start.

The automatic Load Run in programs 1 and 2 is done by following

```
POKE 631, 131: POKE 198, 1: NEW
```

This line is equivalent to holding down the Shift-key and then hitting the Run/Stop key. By putting this line at the end of a program it automatically Loads and Runs the next program on tape. So you should Save program 2 immediately after program 1 and program 3 immediately after program 2.

After typing in programs 1 and 2 you have to Save them before Running them because they both and with a New statement and will destroy themselves. ■

(program 3 continued from page 95)

ELEVATORS

```
885 RETURN
900 PRINT"[illegible]"
904 FORT=1TO6
906 PRINT"[illegible] * * * *** * * * **"
908 NEXT
910 PRINT"[illegible]"
911 PRINTSC:TAB(8);HI"[illegible]"
912 FORX=2TO18STEP2
913 IFX=10THENNEXT
914 V=INT(15*RND(X)+2)
916 FORT=1TOV-1
918 POKE7680+T*22+X,33:POKE38400+T*22+X,7
920 POKE36876,135+T*7
922 FORP=1TO60:NEXT
923 POKE36876,0
924 NEXTT
926 P=7680+X+22*V
927 T=30720+P:POKET,7:POKET+22,7:POKET+44,7
928 T=RND(X)*2:IFT>1THEN932
930 POKEP,27:POKEP+22,28:POKEP+44,29:GOTO934
932 POKEP,60:POKEP+22,61:POKEP+44,62
934 NEXTX
936 POKE8098,44:POKE8120,45
937 POKE8185,31:POKE38985,7
939 FORP=7855TO8163STEP22:POKEP,36:T=6:IFP>8053THENT=7
939 POKEP+30720,T:NEXT
940 FORV=3TO15STEP6
942 FORT=VTOV+2
943 POKE38400+22*T,6
944 POKE7680+22*T,30:NEXT:NEXT
946 FORV=8TO18STEP6
948 FORT=VTOV+2
949 POKE38420+22*T,6
950 POKE7700+22*T,30:NEXT:NEXT
951 POKE8183,44:POKE8184,44
955 FORR=7734TO8064STEP56:POKER,38:POKER+30720,1:NEXT
960 RETURN
```

Program 1.

```
1 REM * ELEVATORS 1 *
2 REM
5 POKE36879,110:PRINT"[illegible]PLEASE WAIT..."
10 POKE56,27:POKE55,0:POKE52,27:POKE51,0:S=0
20 FORP=0TO240
30 READD$:D1$=LEFT$(D$,1):D2$=RIGHT$(D$,1)
40 D1=ASC(D1$):D2=ASC(D2$)
50 G1=D1-48:IFD1>57THENG1=D1-55
60 G2=D2-48:IFD2>57THENG2=D2-55
70 G=16*G1+G2:S=S+G
80 POKE6912+P,G
90 NEXT
95 IFS<>25925THENPRINT"DATA ERROR IN 500-740":END
97 FORP=0TO511:POKE7168+P,PEEK(32768+P):NEXT
100 GOSUB1000
400 PRINT"[illegible]"
490 POKE631,131:POKE198,1:CLR:NEW
499 END
500 DATA A2,AF,BD,DC,1E,C9,1B,D0,12,9D
510 DATA F2,1E,A9,1C,9D,08,1F,A9,1D,9D
520 DATA 1E,1F,A9,21,9D,DC,1E,CA,D0,E4
530 DATA A2,C6,BD,16,1E,C9,1B,D0,12,9D
540 DATA 2C,1E,A9,1C,9D,42,1E,A9,1D,9D
550 DATA 58,1E,A9,21,9D,16,1E,CA,D0,E4,60
560 DATA A2,00,BD,58,1E,C9,3E,D0,12,9D
570 DATA 42,1E,A9,3D,9D,2C,1E,A9,3C,9D
580 DATA 16,1E,A9,20,9D,58,1E,E8,E0,F2
590 DATA D0,E2,A2,00,BD,4A,1F,C9,3E,D0
600 DATA 12,9D,34,1F,A9,3D,9D,1E,1F,A9
610 DATA 3C,9D,08,1F,A9,20,9D,4A,1F,E8
620 DATA E0,84,D0,E2,60
630 DATA A2,15,BD,8C,1F,C9,1B,D0,0F,A9
640 DATA 3C,9D,8C,1F,A9,3D,9D,A2,1F,A9
650 DATA 3E,9D,B8,1F,CA,10,E7,60
660 DATA A2,15,BD,16,1E,C9,3C,D0,0F,A9
670 DATA 1B,9D,16,1E,A9,1C,9D,2C,1E,A9
680 DATA 1D,9D,42,1E,CA,10,E7,60
690 DATA A2,FF,BD,00,1E,C9,1E,30,04,C9
700 DATA 3C,30,05,A9,07,9D,00,96,CA,D0
710 DATA ED,A2,00,BD,00,1F,C9,1E,30,04
720 DATA C9,3C,30,05,A9,07,9D,00,97,CA,D0,ED,60
730 DATA 20,00,1B,20,3D,1B,20,7E,1B,20
740 DATA 9A,1B,20,B6,1B,60
1000 S=0:FORR=1TO26
1002 READX:S=S+X:FORI=XTOX+7:READY:S=S+Y:POKEI,Y:NEXTI
1004 NEXTR
1005 IFS<>216859THENPRINT"[illegible]DATA ERROR"
     :PRINT"[illegible]IN 1000 - 1260":END
1006 RETURN
1010 DATA 7384,24,36,66,129,255,255,255,153
1020 DATA 7392,153,153,187,187,255,255,219,255
1030 DATA 7400,255,189,129,195,255,255,126,0
1040 DATA 7408,255,129,129,129,255,129,129,129
1050 DATA 7416,255,0,0,0,0,0,0,0
1060 DATA 7432,8,8,8,8,8,8,8,8
1070 DATA 7448,223,223,223,0,253,253,253,0
1080 DATA 7456,93,93,93,93,93,93,93,93
1090 DATA 7464,65,65,65,65,65,65,65,65
1100 DATA 7472,126,129,153,185,153,153,189,129
1110 DATA 7480,126,129,189,141,189,177,189,129
1120 DATA 7488,126,129,189,141,189,141,189,129
1130 DATA 7496,126,129,173,173,189,141,141,129
1140 DATA 7504,0,24,24,255,24,56,8,24
1150 DATA 7512,56,56,60,28,8,24,8,56
1160 DATA 7520,0,24,24,255,60,60,24,255
1170 DATA 7528,255,126,60,126,66,66,66,231
1180 DATA 7536,0,24,24,255,24,28,16,24
1190 DATA 7544,28,28,60,56,16,24,16,28
1200 DATA 7648,24,36,66,129,255,255,255,221
1210 DATA 7656,221,153,153,153,255,255,219,255
1220 DATA 7664,255,189,129,195,255,255,126,0
1230 DATA 7632,8,16,32,32,32,32,16,8
1240 DATA 7640,16,8,4,4,4,4,8,16
1250 DATA 7672,0,2,4,8,16,32,64,0
1260 DATA 7168,0,126,126,102,102,126,126,0
```

Program 2.

```
1 REM * ELEVATORS 2 *
2 REM
5 POKE36879,10
6 POKE36869,255:POKE36879,110:PRINT"[illegible]"
9 PRINT"[illegible]S#"
10 FORR=3TO17
20 READR$:R#=R$+R#
30 PRINT"[illegible]"
40 FORP=21TORSTEP-1
50 PRINT"TT";R#
51 IFR#="[illegible]THEN54
52 POKE36876,240-P#9
54 FORT=1TO8:NEXT:POKE36876,0
60 PRINT$:PRINT"TT"
70 NEXTR
80 NEXTR
90 FORT=1TO18000:NEXT
100 PRINT"T2"
105 POKE36869,240
110 FORP=3TO21STEP2
120 READR$:R#="[illegible]"+R$
130 PRINT"[illegible]";R#
140 FORP=21TORSTEP-1
150 PRINT"TT";R#
155 POKE36876,240-P#9:FORT=1TO10:NEXT:POKE36876,0
160 PRINT$:PRINT"TT"
170 NEXTR
180 NEXTR
200 GETR$:IFR#="":THEN200
205 POKE36869,255
210 FORP=21TO2STEP2
220 READR$:R#="[illegible]"+R$
230 PRINT"[illegible]";R#
240 FORP=21TORSTEP-1
250 PRINT"TT";R#
255 POKE36876,240-P#9:FORT=1TO10:NEXT:POKE36876,0
260 PRINT$:PRINT"TT"
270 NEXTR
280 NEXTR
290 PRINT"[illegible]  PRESS A KEY"
300 GETR$:IFR#="":THEN300
310 PRINT"[illegible]PLEASE WAIT[illegible]:POKE631,131:POKE198,1:NEW
799 END
880 DATA "[illegible]"
890 DATA "[illegible]"
920 DATA "[illegible]"
930 DATA"  [illegible]  BY H.WALSHAW"
940 DATA"  INSTRUCTIONS","TRY TO REACH","THE TOP OF THE","BUILDING. DODGE"
950 DATA"THE ELEVATORS","IF YOU DON'T DO","IF YOU PRESS THE","TIME-LIMIT YOU"
960 DATA"ARE DEAD.","[illegible]PRESS A KEY"
980 DATA"[illegible]  KEYS  USED [illegible]/LEFT      RIGHT","[illegible]"
990 DATA"[illegible] SCORE  TABLE [illegible]/A   BONUS    100","[illegible]  BONUS    200","[illegible]  BONUS
    300"
960 DATA"[illegible]  BONUS    400","EACH FLOOR    500","EACH SCREEN 4000"
```

Program 2.

THE ADVENTURE EVENT OF THE YEAR BY

JOHN SHERRY

The Prince

WINNER OF THE 1984 CAMBRIDGE AWARD

Characters in order of Appearance:

Baron Grasper — a landowner

Ambrose — a cleric

Porcus — a merchant

Fernando — a tipstaff

Gamp — a stall holder

plus supporting cast

and finally

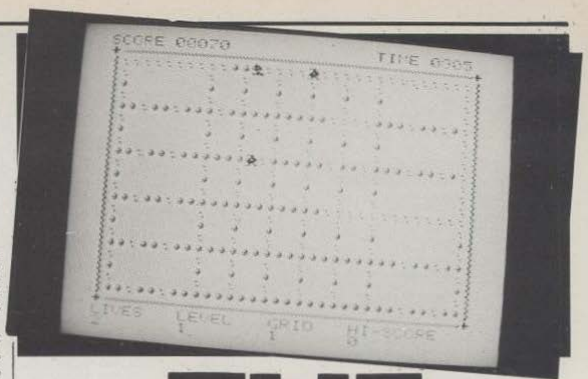
The Prince

THE FIRST ROLE PLAYING GAME FOR FOUR PLAYERS

Available for Spectrum 48K at £7.95 from larger branches of Boots or mail order from
Cases Computer Simulations Ltd., 14 Langton Way, London SE3 7TL
Telephone 01-858 0763

ORIC

Go to work on an egg in P.H. Phoeng's cracking game for the Oric or Atmos computer. Go on and poke that yolk!



THE BROOD

BROOD IS WRITTEN on an Oric-1 48K computer. But as I have not used any bugged Basic commands nor any ROM calls, only a few changes need to be made for Atmos conversion.

Just add one to the X-coordinate of the Plot commands in the following lines: 115, 270, 275, 315, 380, 400, 640, 645, 650, 680, 685, 695, 700, 705, 775, 2005, 2140. Also change

FOR A = 3 TO 34

in line 690 into

FOR A = 4 TO 35

The main loop of the game is written in machine code — #9800-#9A50, entered with Basic — while the rest is written in Basic. The program uses approximately 7K of RAM memory.

The game can be played with the keyboard or with a joystick attached to the right port of a Pase joystick interface. The player is also offered a choice in sound volume.

The player finds himself on a grid in an incubator and the object is to destroy the Munzter's eggs before they hatch. The brood-gridders, who protect the eggs, will make the job a bit harder. But while the player is able to leave the grid, these brood-gridders have to stay on the grid.

The player is equipped with the z-ray, a weapon that will freeze the brood-gridders but at the same time speeds up — by 10 times — the hatching of the eggs.

When all eggs are destroyed the player moves on to the next grid. There are nine different grids. There is a life bonus after every third finished grid while the speed level will be increased after every sixth grid.

If you want to practice on a particular grid, change the grid variable (GR) in line 655.

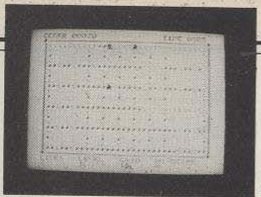
Variables.

GR	:	grid number
HI	:	high score
LE	:	speed level
LI	:	lives
R	:	finished grids counter
SC	:	score
T & T$	:	time
V	:	sound volume

Oric Brood.

```
5 TEXT:CLS:PAPER3:INK4
10 HIMEM#97FF:POKE618,10
15 FORA=#BBB0TO#BBA7
20 POKEA,19:NEXT
25 PRINT"LOADING M.C."
30 GOTO1000
95 REM MAIN LOOP
100 SOUND1,RND(1)*99,V
105 CALL#9800
110 SOUND1,0,0:A=PEEK(17)
115 PLOT16,0,3+A*2:SOUND2,100,V*A
120 IFPEEK(15)<36THEN200
125 T=T-A*9-1:IFT<1THEN150
130 WAIT5-LE:GOTO100
150 REM EGGS HATCHED
155 POKE#BBCB,48:SOUND1,250,V
160 WAIT100:POKE4,165:POKE5,37
165 FORA=1TO30:SOUND1,150,V
170 CALL#99FA:SOUND1,0,0:NEXT
175 POKE5,167:CALL#99FA
180 SOUND2,900,V:WAIT100
185 POKE(DEEK(0)),162:POKE5,39
190 FORA=1TO51:SOUND2,A*5,V
195 CALL#99FA:NEXT
200 IFPEEK(15)=0THEN300
205 REM LOSE LIFE
210 A=DEEK(0):FORB=127TO32STEP-1
215 POKEA,B:SOUND2,B,V:NEXT
220 SOUND2,0,0
225 LI=LI-1:POKE18,#BF91:PRINTLI
230 WAIT200:CLS
235 IFLI>0THEN660
240 SC$=""
245 FORA=#BBB1TO#BBB5
250 SC$=SC$+CHR$(PEEK(A))
255 NEXT:SC=VAL(SC$)
260 A$="GAME OVER"
265 IFSC>HITHENA$="HIGHEST SCORE":HI=SC
270 PLOT9,10,A$
275 PLOT9,12,"TRY AGAIN ? (Y/N)"
280 BETA$:IFA$="Y"THEN640
285 IFA$<>"N"THEN280
290 DOKE621,48000:POKE623,27:END
300 REM FINISHED
305 CLS:GR=GR+1
310 IFGR=10THENGR=1
315 PLOT14,9,"BONUS 0"
320 FORA=0TO31:B=#BBC8+A
325 POKE#BD26+A,PEEK(B):NEXT
330 FORA=1TO200:SOUND2,RND(1)*100,V
335 NEXT:SOUND2,0,0
340 C=0:FORA=0TO4:SOUND1,200+50*A,V
345 B=PEEK(#BBB5-A)+PEEK(#BD29-A)
350 B=B-48+C:C=0
355 IFB>57THENC=1:B=B-10
360 POKE(#BBB5-A),B+128
365 WAITB0:POKE(#BBB5-A),B
370 SOUND1,0,0:NEXT
375 R=R+1:IFR/3>INT(R/3)THEN430
380 PLOT14,11,"LIVE BONUS":LI=LI+1
385 FORA=0TO200:SOUND1,ABS(100-A),3
390 NEXT:SOUND1,0,0
395 IFR/6>INT(R/6)THEN430
400 PLOT14,13,"LEVEL INCREMENT"
405 IFLE<4THENLE=LE+1
410 FORA=1TO10:FORB=1TO6
415 MUSIC1,B,A,V:MUSIC2,1,A,V
420 WAIT1:NEXTB,A
425 SOUND1,0,0:SOUND2,0,0
430 WAIT200:GOTO660
600 REM INITIALIZE, SET UP SCREEN
605 PLAY3,2,0,0
610 CLS:PAPER3:INK0
625 FORA=1TO24:PRINT:NEXT
630 DOKE621,48080:POKE623,21
635 PRINT" LIVES","LEVEL","GRID","HI-SCORE"
```

(continued on next page)



(continued from previous page)

```
640 PLOT2,0,"SCORE 00000"
645 PLOT26,0,"TIME"
650 PLOT15,0,CHR$(12)+CHR$(3)+"Z-RAY"+CHR$(8)+CHR$(4)
655 BC=0:L1=3:LE=1:GR=1:R=0
660 CLS:DOKE18,#BF91
665 PRINTL1,"  "LE,"  "GR,"  "HI
670 A=INT(RND(1)*3)+20:IFA=20THENA=18
675 FORB=3TO23:POKE#BB80+40*B,A:NEXT
680 PLOTO,0,4:PLOTO,24,1:PLOTO,25,1
685 FORA=2TO22:PLOT1,A,9:NEXT
690 FORA=3TO34:PLOTA,1,38:PLOTA,23,38:NEXT
695 FORA=2TO22:PLOT2,A,38:PLOT35,A,38:NEXT
700 PLOT2,1,43:PLOT35,1,43
705 PLOT2,23,43:PLOT35,23,43
710 GOSUB900+GR*10
715 POKE0,251:POKE1,187:CALL#99A9
720 POKE0,252:POKE1,187
725 POKE2,A:POKE3,B:CALL#99D1
730 POKE0,C:POKE1,D
735 POKE2,E:POKE3,F:CALL#99D1
740 REBTORE
745 FORA=0TO18:READB:POKEA,B:NEXT
750 REM ZERO PAGE DATA
755 DATA252,187,1,1,36
760 DATA27,188,32,1,165
765 DATA99,191,32,21,165
770 DATA191,0,0,35
775 POKE14,B:PLOT31,0,T#
780 T=VAL(T$)
785 GOTO100
800 REM JOYSTICK DATA
805 POKE#9804,0:POKE#9805,4
810 POKE#9809,173:POKE#980A,176
815 POKE#980C,138:POKE#980D,24
820 POKE#980E,105:POKE#980F,32
825 POKE#9810,170:POKE#9814,191
830 POKE#9815,176
835 POKE#9820,183:POKE#983A,175
840 POKE#9854,190:POKE#986E,189
845 GOTO2200
900 REM GRID DATA
910 A=31:B=62:C=4:D=188:E=3:F=18
915 G=207:T$="1000":RETURN
920 A=31:B=62:C=255:D=187:E=5:F=30
925 G=183:T$="1000":RETURN
930 A=1:B=8:C=20:D=188:E=1:F=8
935 G=235:T$="1500":RETURN
940 A=3:B=15:C=15:D=188:E=3:F=15
945 G=181:T$="1500":RETURN
950 A=12:B=36:C=255:D=187:E=4:F=32
955 G=198:T$="1500":RETURN
960 A=8:B=32:C=3:D=188:E=8:F=32
965 G=183:T$="1000":RETURN
970 A=7:B=35:C=255:D=187:E=7:F=35
975 G=193:T$="1000":RETURN
980 A=2:B=12:C=17:D=188:E=2:F=12
985 G=215:T$="1500":RETURN
990 A=8:B=32:C=255:D=187:E=5:F=35
995 G=199:T$="1000":RETURN
1000 REM REDEFINE CHARACTERS
1005 FORA=0TO18:READB:NEXT
1010 FORA=4736TO4743
1015 READB:POKEA,B:NEXT
1020 REM BROOD-GRIDDER
1025 DATA28,4,14,27,62,28,10,49
1030 REM PLAYER
1035 DATA8,28,42,62,8,4,31,21
1040 DATA4,14,21,31,4,8,62,42
1045 REM GRID
1050 DATA0,0,8,0,0,4,0,0
1055 REM EBB
1060 DATA63,51,41,33,33,51,63,63
1065 REM EDGE
1070 DATA4,4,8,8,4,4,8,8
1075 REM MUNZTER
1080 DATA9,18,10,31;21,14,10,19
1085 FORA=4638TO4639I
1090 READB:POKEA,B:NEXT
1095 DATA0,0,0,21,42,0,0,0
1100 REM MC
1105 FORA=8402TO8422
1110 READB$:B=VAL("#"+B$)
1115 POKEA,B:NEXT
1120 DATA AD,1,3,48,AD,3,3,48
1125 DATA A9,D0,8D,3,3,A9,80
1130 DATA 8D,F,3,AD,F,3,8D,0,4
1135 DATA 68,8D,3,3,68,8D,F,3,60
1140 FORA=89BOOTO#9A50
1145 READB$:B=VAL("#"+B$)
1150 POKEA,B:NEXT
1155 DATA 20,2,4,AE,8,2,A0,0,E0,84,D0
1160 DATA 7,E6,11,4C,19,98,E6,11,E0
1165 DATA 38,F0,2,86,F,A6,F,A5,4,91,0
1170 DATA E0,B4,D0,16,A2,0,20,D6,98
1175 DATA B1,0,C9,26,D0,6,20,E2,98,4C
1180 DATA AD,98,E6,3,4C,84,98,E0,9C
1185 DATA D0,16,A2,0,20,E2,98,B1,0,C9
1190 DATA 26,D0,6,20,D6,98,4C,AD,98
1195 DATA C6,3,4C,84,98,E0,AC,D0,16
1200 DATA A2,0,20,F5,98,B1,0,C9,26
1210 DATA D0,6,20,EE,98,4C,AD,98,C6,2
1210 DATA 4C,84,98,E0,BE,D0,E,A2,0,20
1215 DATA EE,98,B1,0,C9,26,D0,6,20,F5
1220 DATA 98,4C,AD,98,E6,2,C9,21,D0,3
1225 DATA 85,F,60,85,4,C9,A5,D0,1C,C6
1230 DATA 10,38,E9,81,85,4,A2,4,FE,B1
1235 DATA BB,BD,B1,BB,C9,3A,D0,9,A9
1240 DATA 30,9D,B1,BB,CA,4C,9A,98,A5
1245 DATA 12,49,1,85,12,91,0,A5,10,D0
1250 DATA 3,85,F,60,A5,11,C9,1,D0,3C
1255 DATA A2,3,BD,C7,BB,C9,30,D0,6,CA
1260 DATA D0,F6,60,EA,EA,A2,2,4C,95
1265 DATA 99,18,B5,0,69,28,95,0,90,2
1270 DATA F6,1,60,38,B5,0,E9,28,95,0
1275 DATA B0,2,D6,1,60,F6,0,D0,2,F6,1
1280 DATA 60,B5,0,D0,2,D6,1,D6,0,60
1285 DATA 84,11,A2,5,B5,4,81,0,E0,5
1290 DATA D0,17,A5,3,D5,3,B0,11,20,E2
1295 DATA 98,A1,0,C9,22,90,5,D6,3,4C
1300 DATA 7D,99,20,D6,98,A5,2,D5,2,B0
1305 DATA 11,20,F5,98,A1,0,C9,22,90,5
1310 DATA D6,2,4C,7D,99,20,EE,98,B5,3
1315 DATA C5,3,B0,11,20,D6,98,A1,0,C9
1320 DATA 22,90,5,F6,3,4C,7D,99,20,E2
1325 DATA 98,B5,2,C5,2,B0,11,20,EE,98
1330 DATA A1,0,C9,22,90,5,F6,2,4C,7D
1335 DATA 99,20,F5,98,A5,3,D5,3,B0,1A
1340 DATA 20,E2,98,A1,0,C9,22,B0,6,20
1345 DATA D6,98,4C,86,99,D6,3,C5,12
1350 DATA D0,3,85,F,60,95,4,A9,21,81
1355 DATA 0,E0,5,D0,5,A2,A,4C,2,99,A2
1360 DATA 3,DE,C8,BB,BD,C8,BB,C9,2F
1365 DATA D0,9,A9,39,9D,C8,BB,CA,4C
1370 DATA 95,99,60,A2,6,A0,20,A9,A5
1375 DATA 91,0,B8,91,0,B8,F0,8,A9,24
1380 DATA 91,0,B8,4C,AD,99,CA,D0,1,60
1385 DATA 18,A5,00,69,A0,85,0,90,2,E6
1390 DATA 1,4C,AB,99,A2,15,A9,A5,A0,0
1395 DATA 91,0,48,98,18,65,2,A8,68,C4
1400 DATA 3,D0,F3,CA,D0,1,60,48,A5,0
1405 DATA 18,69,28,85,0,90,2,E6,1,68
1410 DATA 49,81,4C,D5,99,A9,FC,85,2
1415 DATA A9,BB,85,3,A0,0,B1,2,C9,13
1420 DATA D0,9,A5,4,A6,5,85,5,86,4,60
1425 DATA C5,4,D0,4,A5,5,91,2,E6,2,D0
1430 DATA 2,E6,3,4C,4,9A,A0,0,84,0,B4
1435 DATA 2,B4,3,A9,5,85,1,A5,9C,C5,0
1440 DATA D0,7,A5,9D,C5,1,D0,1,60,B1
1445 DATA 0,18,65,2,85,2,90,2,E6,3,E6
1450 DATA 0,D0,2,E6,1,4C,30,9A
1450 CLS:CALL#9A24
1460 PRINT"CHECKSUM",DEEK(2)
1465 PRINT:PRINT"PRESS ANY KEY"
1470 A$=KEY$:GETA$:CLS
2000 REM INSTRUCTIONS
2005 FORA=1TO2:PLOT12,A,CHR$(10)+CHR$(1)+"B R O O D":
NEXT
2010 PRINT:PRINT:PRINT:PRINT
2015 PRINT"By T.W.Phoenng "CHR$(96)" june 1984"
2020 PRINT:PRINT"You're inside an incubator in which"
2025 PRINT"eggs of the munzter are stored on a"
2030 PRINT"grid."
2035 PRINT"Your task is to destroy these eggs"
2040 PRINT"before they hatch."
2045 PRINT"An easy job if there hadn't been any"
2050 PRINT"brood-gridders coming after you."
2055 PRINT"Fortunately they can not leave the"
2060 PRINT"grid but they are able to get you"
2065 PRINT"when you come near the grid."
2070 PRINT"At any time you can freeze the brood-"
2075 PRINT"gridders with your z-ray. But as this"
2080 PRINT"also speeds up the hatching of the"
2085 PRINT"eggs, you should not use this weapon"
2090 PRINT"too often."
2095 PRINT"If time runs out the eggs hatch and"
2100 PRINT"the young munzters will kill you with"
2105 PRINT"their radiation."
2110 PRINT:PRINT
2115 PRINT"PRESS ANY KEY";
2120 A$=KEY$:GETA$:CLS
2125 PRINT" "CHR$(137)"@"CHR$(136)". . . that's you"
2130 PRINT:PRINT" "CHR$(137)"!"CHR$(136)". . . brood gridder"
2135 PRINT:PRINT" "CHR$(137)" "CHR$(136)". . . egg"
2140 PLOT3,4,165
2145 PRINT:PRINT" "CHR$(137)""CHR$(136)". . . young
     munzter"
2150 PRINT:PRINT:PRINT
2155 PRINT"MOVEMENT CONTROL :"
2160 PRINT"the cursor-keys or a joystick (PASE"
2165 PRINT"interface, right port)"
2170 PRINT:PRINT"ON/OFF SWITCH OF Z-RAY :"
2175 PRINT"space bar or fire button"
2180 PRINT:PRINT:PRINT
2185 PRINT"JOYSTICK CONTROL (Y/N) ?"
2190 GETA$:IFA$="Y"THEN800
2195 IFA$<>"N"THEN2190
2200 PRINT:PRINT
2205 PRINT"INPUT SOUND LEVEL (0-15)";
2210 INPUTV
2215 IFV<0ORV>15THEN2210
2220 GOTO600
```

You'd expect one of the best-selling home computers in Japan to have a specification list as big as its memory.

But the Toshiba HX10 doesn't just limit itself to that.

It was developed along with other Japanese home computers to operate on one language: MSX. You can swap programs, games, cassettes, even peripherals like disk drives, printers, and joysticks: they're all compatible with every other MSX computer.

All of which makes MSX the system of the future.

So if you want a computer that won't be obsolete in a few years, buy an MSX. If you want one of the best-selling MSX computers in Japan, buy a Toshiba HX10.

TOSHIBA MSX

FOR MORE INFORMATION ON THE TOSHIBA HX10 CONTACT TOSHIBA (UK) LTD., TOSHIBA HOUSE, FRIMLEY ROAD, FRIMLEY, SURREY GU16 5JJ. TEL: (0276) 681691.

CBM-64

Patrick Edmond takes you on a trip into the awesome caverns of the cosmos. As your ship speeds up and the aliens grow more hostile, can you stay in control?

COSMIC CAVERN IS a machine-code game for the Commodore 64, incorporating smooth scrolling techniques with flicker-free display, and can be played with a joystick or from the keyboard. Shoot as many aliens as possible while avoiding crashing your spaceship into them or the walls of the cavern. Use a joystick to control your spaceship or:

N for left, M to move right.
Commodore key to move down.
Control key to move up.
Shift key to fire.

If you want to fire continuously, press the Shift Lock key rather than hold the fire button or Shift key down all the time.

At regular intervals your spaceship will accelerate by a factor of one, shown on the speed indicator. At the same time a square pulsating anti-matter pod will appear in the cavern. If you shoot it the resultant shock wave slows down your spaceship by a factor of one.

However, in practice you may miss the pod and remain on speed level 2 which is more difficult to steer through. Should you go past speed level 7, you will return to speed 1 and be awarded a massive 100,000 points, but if you reach speed level 4, for example, you will see how difficult it is to steer down the cavern at such high speed.

You are warned of the acceleration of your spaceship by the time indicator which counts down from right to left. The bullet indicator simply shows which of the seven torpedo barrels is to be fired next. The values of the various aliens are displayed on screen above the speed, bullet and time indicators.

Inevitably you will crash your spaceship, the computer will take over, showing all seven speed levels, and then stop. Press the fire button or space bar to return to the start, which will clear your score unless you attained the

```
2 GOSUB 200
4 POKE53280,0:POKE53281,0
6 PRINT"■■■";SPC(12);"-OSMIC CAVERN"
8 PRINT:PRINT"↖NSTRUCTIONS :";CHR$(14)
10 PRINT"■  ⌐ILOT YOUR SPACESHIP DOWN THE WINDING"
12 PRINT" CAVERN USING A JOYSTICK (IN PORT 2) OR"
14 PRINT" THE FOLLOWING KEYS :"
16 PRINT"■ / - LEFT    \ - RIGHT"
18 PRINT" ⌐= - DOWN    CTRL - UP"
20 PRINT" ♥HIFT KEY TO FIRE,SHIFT LOCK=AUTO FIRE"
22 PRINT"■ OHEN THE GAME COMMENCES YOU ARE IN THE"
24 PRINT" ENTRANCE TO THE CAVERN ,SO PRESS SPACE"
26 PRINT" BAR OR FIRE BUTTON TO ENTER THE CAVERN"
28 PRINT" ....SHOOT THE ALIENS TO INCREASE YOUR"
30 PRINT" SCORE. ↑T REGULAR VERVALS YOUR SHIP"
32 PRINT" ACCELERATES AND YOU MUST SHOOT THE "
34 PRINT" PULSATING ANTIMATTER POD WHICH APPEARS"
36 PRINT" AND THE EXPLOSION FORCE WILL SLOW DOWN"
38 PRINT" YOUR SHIP. ⌐OWEVER ,YOU CAN MISS IT AND"
40 PRINT" CARRY ON AT THE HIGHER SPEED IF YOU"
42 PRINT" WISH. ■PRESS A KEY TO CONTINUE":POKE198,0
44 GETA$:IFA$=""THEN44
46 PRINT"■▲ HERE ARE THREE INSTRUMENTS WHICH WILL"
48 PRINT" AID YOUR JOURNEY DOWN THE CAVERN :"
50 PRINT"■ ♥PEED▲ : THIS INDICATES YOUR CURRENT"
52 PRINTSPC(9);"SPEED BY A MARKER ON A SCALE."
54 PRINT"■ ⌐ULLET▲ : THIS INDICATES WHICH BARREL"
56 PRINTSPC(10);"OF THE TORPEDO GUN IS READY"
58 PRINTSPC(10);"FOR FIRING."
60 PRINT"■ ⌐IME▲ : THIS INDICATES WHEN THE SHIP IS"
62 PRINTSPC(8);"ABOUT TO ACCELERATE AND WHEN"
64 PRINTSPC(8);"AN ANTIMATTER POD WILL APPEAR"
66 PRINTSPC(8);"(BOTH EVENTS OCCUR"
68 PRINTSPC(8);"SIMULTANEOUSLY)."
70 PRINT"■ HE TIME READOUT IS THE MOST USEFUL OF"
72 PRINT" THESE INSTRUMENTS."
74 PRINT"  ↖F YOU REACH SPEED 7 AND ACCELERATE"
76 PRINT" AGAIN YOU WILL RETURN TO SPEED 1 AND"
78 PRINT" RECEIVE 100000 POINTS !"
80 PRINT" ↖F YOU CRASH,WAIT UNTIL THE SHIP STOPS"
82 PRINT" THEN PRESS SPACE BAR OR FIRE BUTTON TO"
84 PRINT" RETURN TO THE START."
86 PRINT"■■PRESS A KEY TO START":POKE198,0
88 GETA$:IFA$=""THEN88
90 SYS18048
200 PRINT"■■ ENTERING DATA,PLEASE WAIT"
202 I=16384
204 READA$:IFA$="*"THENRETURN
206 L=ASC(LEFT$(A$,1))-48
208 IFL>9THENL=L-7
210 R=ASC(RIGHT$(A$,1))-48
212 IFR>9THENR=R-7
214 POKEI,16*L+R:I=I+1:GOTO204
300 DATAA9,3F,8D,11,D0,A9,18,8D
302 DATA18,D0,A5,F4,F0,19,C6,F3
304 DATA10,10,A9,11,8D,04,D4,A9
306 DATA08,E5,FF,0A,0A,0A,85,F3
308 DATAD0,05,A9,00,8D,04,D4,AD
310 DATA12,D0,18,C9,B0,90,F8,A9
312 DATA1F,8D,11,D0,A9,18,8D,18
314 DATAD0,A9,00,8D,8E,02,A9,00
316 DATA85,F1,85,F0,85,EF,A5,F4
318 DATAD0,03,4C,78,43,20,9F,FF
320 DATAAE,8D,02,8A,29,01,85,F1
322 DATA8A,29,02,85,F0,8A,29,04
324 DATA85,EF,AD,00,DC,29,10,49
326 DATA10,05,F1,85,F1,A5,C5,C9
328 DATA27,F0,07,AD,00,DC,29,04
330 DATAD0,0E,AD,00,D0,38,E5,FF
332 DATA8D,00,D0,B0,03,CE,10,D0
```

COSMIC CAVERN

high score, and press fire button or spacebar again to commence journey into the cavern.

Cosmic Cavern can be typed in exactly as shown and Saved. However, if you own an assembler, type in lines 4 to 90 and add:

2 C = C + 1:IFC = 1THEN LOAD"",1,1

and Save on cassette. Next enter the hex code of lines 900 to 904 directly into memory with your assembler beginning at 4000 hex, and Save 4000 to 4980 hex on cassette after the shortened Basic program just mentioned. Typing Cosmic Cavern in this way avoids the delay associated with the subroutine at line 200

(continued on page 103)

```
334 DATAA5,C5,C9,24,F0,07,AD,00
336 DATADC,29,08,D0,0E,AD,00,D0
338 DATA18,65,FF,8D,00,D0,90,03
340 DATAEE,10,D0,AD,01,D0,C9,36
342 DATAF0,11,A5,EF,D0,07,AD,00
344 DATADC,29,01,D0,06,CE,01,D0
346 DATACE,01,D0,AD,01,D0,C9,94
348 DATAF0,11,A5,F0,D0,07,AD,00
350 DATADC,29,02,D0,06,EE,01,D0
352 DATAEE,01,D0,C6,FA,10,08,A9
354 DATA85,85,FA,A5,F1,D0,03,4C
356 DATA60,41,C6,FB,10,04,A9,06
358 DATA85,FB,A5,FB,A8,0A,AA,AD
360 DATA01,D0,9D,03,D0,AD,00,D0
362 DATA9D,02,D0,A9,01,0A,88,10
364 DATAFC,A8,49,FF,2D,10,D0,8D
366 DATA10,D0,AD,10,D0,29,01,F0
368 DATA07,98,0D,10,D0,8D,10,D0
370 DATAA9,04,95,E1,AD,00,D0,4A
372 DATA4A,4A,38,E9,02,95,E0,B0
374 DATA02,D6,E1,AD,10,D0,29,01
376 DATAF0,0B,B5,E0,18,69,20,95
378 DATAE0,90,02,F6,E1,AD,01,D0
380 DATA38,E9,32,29,F8,A8,18,75
382 DATAE0,95,E0,90,02,F6,E1,98
384 DATA0A,18,0A,90,02,F6,E1,18
386 DATA75,E0,95,E0,90,02,F6,E1
388 DATAA5,FA,A2,06,9D,28,D0,CA
390 DATA10,FA,A2,00,B5,E1,F0,38
392 DATA85,F9,B5,E0,85,F8,A0,00
394 DATAB1,F8,F0,03,4C,37,43,A0
396 DATA28,B1,F8,D0,F7,BD,03,D0
398 DATA18,69,08,9D,03,D0,18,C9
400 DATAA0,90,0A,A9,00,9D,03,D0
402 DATA95,E1,4C,A8,41,B5,E0,18
404 DATA69,28,95,E0,90,02,F6,E1
406 DATAE8,E8,E0,0E,D0,BE,A5,F4
408 DATAF0,1B,A5,F1,D0,06,A9,20
410 DATA8D,0B,D4,4C,C3,41,A9,21
412 DATA8D,0B,D4,A5,F8,4A,4A,4A
414 DATA09,20,8D,08,D4,A9,00,85
416 DATAF9,A5,FE,38,E5,FF,29,07
418 DATA85,FE,90,03,4C,1F,43,A9
420 DATA04,8D,FF,41,8D,02,42,A9
422 DATA28,8D,FE,41,A9,00,8D,01
424 DATA42,8D,04,42,A9,D8,8D,05
426 DATA42,A0,0F,A2,27,BD,58,06
428 DATA9D,30,06,9D,30,DA,CA,10
430 DATAF4,88,F0,2C,C0,06,D0,03
432 DATA20,2F,43,AD,01,42,18,69
434 DATA28,8D,01,42,8D,04,42,90
436 DATA06,EE,02,42,EE,05,42,AD
438 DATAFE,41,18,69,28,8D,FE,41
440 DATA90,03,EE,FF,41,4C,FB,41
442 DATAAD,1B,D4,29,01,F0,0B,A5
444 DATAFD,C9,19,F0,0E,E6,FD,4C
446 DATA50,42,A5,FD,F0,02,C6,FD
448 DATAA9,00,A2,27,9D,58,06,CA
450 DATA10,FA,A6,FD,A9,0D,9D,58
452 DATA06,9D,59,06,9D,65,06,9D
454 DATA66,06,CA,30,0B,AD,1B,D4
456 DATA29,07,9D,58,06,CA,10,F5
458 DATAA5,FD,18,69,0F,AA,AD,1B
460 DATAD4,29,07,9D,58,06,E8,E0
462 DATA29,D0,F3,AD,1B,D4,29,1F
464 DATA18,C9,0A,B0,10,18,65,FD
466 DATAAA,E8,E8,AD,1B,D4,29,07
468 DATA69,10,9D,58,06,A5,F4,F0
470 DATA35,C6,F2,D0,31,A9,80,85
472 DATAF2,A5,FD,69,06,AA,A9,09
474 DATA9D,58,06,A6,FF,E8,8A,29
476 DATA07,85,FF,E0,08,D0,17,A2
478 DATA02,FE,A3,07,BD,A3,07,C9
480 DATA3C,D0,09,A9,32,9D,A3,07
482 DATACA,4C,C9,42,E6,FF,A6,FF
484 DATABD,40,44,8D,22,D0,A5,F4
486 DATAD0,17,A5,FD,18,69,0A,0A
488 DATA0A,0A,8D,00,D0,AD,10,D0
490 DATA29,FE,90,02,09,01,8D,10
492 DATAD0,CE,23,D0,AD,11,D0,29
494 DATA7F,8D,11,D0,A9,A8,8D,12
496 DATAD0,AD,19,D0,09,81,8D,19
498 DATAD0,68,A8,68,AA,68,40,A2
500 DATA04,A0,C0,88,D0,FD,CA,D0
502 DATAF8,20,2F,43,4C,DE,42,A9
504 DATA10,05,FE,8D,11,D0,60,C9
506 DATA09,D0,0B,A5,FF,C6,FF,D0
508 DATA02,E6,FF,4C,56,43,C9,0D
510 DATAD0,0A,A9,00,9D,03,D0,95
512 DATAE1,4C,A8,41,29,EF,85,F7
514 DATAA9,00,91,F8,A9,03,8D,13
516 DATAD4,A9,05,8D,14,D4,A9,81
518 DATA8D,12,D4,A9,0F,8D,18,D4
520 DATAA9,80,8D,12,D4,4C,A8,41
522 DATAA2,80,CA,D0,FD,4C,D1,41
524 DATA10,10,00,3C,F0,00,33,30
526 DATA00,33,30,00,3F,F0,00,0F
528 DATAC0,00,03,00,00,03,00,00
530 DATA00,00,00,00,00,00,00,00
532 DATA00,00,00,00,00,00,00,00
534 DATA00,00,00,00,00,00,00,00
536 DATA00,00,00,00,00,00,00,00
538 DATA00,00,00,00,00,00,00,00
540 DATA01,00,00,02,00,00,01,00
542 DATA00,02,00,00,01,00,00,02
544 DATA00,00,01,00,00,02,00,00
546 DATA01,00,00,02,00,00,01,00
548 DATA00,02,00,00,01,00,00,00
550 DATA00,00,00,00,00,00,00,00
552 DATA00,00,00,00,00,00,00,00
554 DATA00,00,00,00,00,00,00,00
556 DATA00,00,00,00,00,00,00,00
```

(listing continued on page 103)

You are commanding a squadron of four ground attack aircraft...

The mission is seemingly hopeless.

Fly along the river at zero altitude, twisting and turning crazily to stay within its tortuous banks, blasting at anything and everything in sight. Especially the bridges.

Three of your jets are held in reserve while you are pitched against Battleships, Enemy Aircraft, Land Tanks, Balloons, Helicopter Gunships. All intent only on your destruction.

And destroy you they will, if you don't get them first. You'll need to keep an eye on your fuel gauge. But take comfort, you can take fuel on board from one of the special depots.

If you get hit - and nobody has yet reached the end of the river - your next reserve starts at the last bridge you blasted on your way through!

Each target you destroy adds to your points score.

Like all Activision Software, River Raid will hold you and keep you coming back for more.

Chocks away!

Lose yourself in the world of ACTIVISION®

(continued from page 101)

every time you play the game, but if you don't own an assembler I'm afraid that every time you load Cosmic Cavern you will have to endure this delay while the Basic subroutine enters the data into memory. Please check carefully that the hex code has been entered correctly before running.

The heart of the program is an interrupt routine located at 4000 hex to 4380. In Cosmic Cavern all interrupt sources, such as the timer chips, are disabled except for the raster interrupt. The raster scan is controlled by the '64 transfers the screen memory on to the television from top to bottom every 1/60th of a second, and the process takes about 1/60th of a second.

The raster position can be found in locations D011 and D012 hex, and in Cosmic Cavern a latch is set so that an interrupt request is generated when the raster scan is about half way down the screen. This is explained in the programmer's reference guide. When this interrupt occurs the routine at 4000 hex commences, the '64 is set into 25 row mode so that the score and instruments are held stationary, the spaceship is moved according to joystick or keyboard and any bullets are moved down the screen.

Finally, the cavern is shifted up the screen by one bit — since smooth scrolling is involved the cavern is only moved a fraction of a whole character up the screen — multiplied by the spaceship speed, and the scroll position is updated in register D011 hex. If this movement exceeds seven bits the screen memory is shifted up one whole character and the cavern wall blocks and starts are added on to the bottom of the existing cavern. By now the raster has completed a scan, so return to the top of the screen; the 64 is set in 24-row mode so that the smooth scroll position, lower three bits of D011 hex, takes effect and completes the interrupt.

Speed, bullet and time

The program running under this interrupt is responsible for the speed bullet and time instruments and also waits for the spaceship to collide with an alien or cavern walls — sprite to background collision detector D01F hex — if a collison does occur this program takes over control of the spaceship producing the crash effect and then resets for another game.

A cassette is available containing two copies of Cosmic Cavern for £3.00 including postage and packing.

Send a cheque or postal order to Patrick Edmond, "Le Nid", Scarborough Road, Driffield, East Yorks, YO25 7EQ. ■

(listing continued from page 101)

```
558 DATA00,00,00,00,00,00,03,00
560 DATA00,00,00,30,00,00,00,00
562 DATA01,00,00,00,00,00,00,00
564 DATA00,00,60,00,00,00,00,00
566 DATA00,00,00,00,00,00,00,30
568 DATA60,00,00,00,00,00,00,00
570 DATA00,30,00,00,00,00,00,00
572 DATA00,07,06,05,03,01,0B,02
574 DATAAA,AA,BE,BE,BE,BE,AA,AA
576 DATA00,00,00,00,00,00,00,00
578 DATAFF,FF,FF,AA,FF,FF,FF,AA
580 DATAFF,FF,D7,D7,D7,D7,FF,FF
582 DATAFF,55,FF,55,FF,55,FF,55
584 DATA00,00,00,00,00,00,00,00
586 DATA00,00,00,00,00,00,00,00
588 DATA00,00,00,00,00,00,00,00
590 DATA18,3C,7E,C3,C3,7E,66,E7
592 DATA18,3C,18,7E,18,FF,18,FF
594 DATA18,18,3C,7E,5A,7E,DB,DB
596 DATA7E,FF,DB,DB,DB,DB,FF,7E
598 DATAC3,DB,DB,DB,7E,3C,7E,DB
600 DATA00,18,38,7C,FE,7C,38,10
602 DATA3C,FF,DB,FF,7E,3C,00,00
604 DATA00,7C,FE,C6,C6,FE,C6,C6
606 DATA00,FC,FE,C6,FE,C6,FE,FC
608 DATA00,7C,FE,C0,C0,C0,FE,7C
610 DATA00,FC,FE,C6,C6,C6,FE,F
612 DATA00,FC,FE,C0,F0,C0,FE,FC
614 DATA00,FC,FE,C0,F0,C0,C0,C0
616 DATA00,7C,FE,C0,C0,C6,FE,7C
618 DATA00,C6,C6,C6,FE,C6,C6,C6
620 DATA00,3C,FE,18,18,18,FE,3C
622 DATA00,00,00,00,00,66,66,0E
624 DATA00,C0,C6,CC,F8,CC,C6,C0
626 DATA00,C0,C0,C0,C0,C0,FE,FC
628 DATA00,C6,EE,FE,D6,C6,C6,C6
630 DATA00,C6,E6,F6,DE,CE,C6,C6
632 DATA00,7C,FE,C6,C6,C6,FE,7C
634 DATA00,7C,FE,C6,FE,FC,C0,C0
636 DATA00,7C,FE,C6,C6,CC,FE,76
638 DATA00,7C,FE,C6,FE,FC,C6,C6
640 DATA00,7C,FE,C0,7C,06,FE,7C
642 DATA00,7C,FE,18,18,18,18,18
644 DATA00,C6,C6,C6,C6,C6,FE,7C
646 DATA00,C6,C6,C6,C6,6C,7C,38
648 DATA00,C6,C6,D6,D6,FE,FE,7C
650 DATAFC,C0,FC,0D,FF,06,0C,18
652 DATA00,C6,C6,E6,7E,06,FE,7C
654 DATA30,60,C0,83,C3,DB,DB,FF
656 DATA00,7C,FE,C6,C6,C6,FE,7C
658 DATA00,18,38,18,18,18,18,3C
660 DATA00,7C,FE,06,0C,30,FE,7C
662 DATA00,7C,FE,06,1E,06,FE,7C
664 DATA00,60,60,6C,7E,0C,0C,0C
666 DATA00,7C,FE,C0,FC,06,FE,7C
668 DATA00,7C,FE,C0,FC,C6,FE,7C
670 DATA00,7C,FE,0C,0C,18,18,18
672 DATA00,7C,FE,C6,FE,C6,FE,7C
674 DATA00,7C,FE,C6,FE,06,FE,7C
676 DATA11,00,33,32,00,12,00,34
678 DATA32,00,13,00,35,32,00,14
680 DATA00,36,32,00,15,00,37,32
682 DATA00,16,00,38,32,00,17,00
684 DATA39,32,00,00,09,00,33,32
686 DATA2A,27,1C,1C,1B,00,0C,0C
688 DATA0C,0C,0C,0C,0C,00,00,19
690 DATA2C,23,23,1C,2B,00,0C,0C
692 DATA0C,0C,0C,0C,0C,00,00,2B
694 DATA20,24,1C,00,0C,0C,0C,0C
696 DATA30,26,2C,29,00,2A,1A,26
698 DATA29,1C,00,32,32,32,32,32
700 DATA32,32,32,00,00,1F,20,1E
702 DATA1F,00,2A,1A,26,29,1C,00
704 DATA32,32,32,32,32,32,32,32
706 DATA00,00,00,00,1A,26,2A,24
708 DATA20,1A,00,1A,18,2D,1C,29
710 DATA25,00,19,30,00,27,18,2B
712 DATA29,20,1A,22,00,1C,1B,24
714 DATA26,25,1B,00,00,00,00,00
716 DATA78,A9,40,8D,15,03,A9,00
718 DATA8D,14,03,8D,20,D0,8D,21
720 DATA0D,A9,43,8D,19,03,A9,1E
722 DATA8D,18,03,A9,00,8D,0E,D0
724 DATA8D,0E,DC,8D,11,D0,A2,00
726 DATA A9,00,9D,00,04,9D,00,05
728 DATA9D,00,06,9D,00,07,9D,00
730 DATAD8,9D,00,D9,9D,00,DA,9D
732 DATA00,DB,E8,D0,E5,A9,00,9D
734 DATA00,D0,E8,E0,11,D0,F8,A2
736 DATA06,A9,21,9D,F9,07,CA,10
738 DATAFA,A9,36,8D,01,D0,A9,A0
740 DATA8D,00,D0,A9,FF,8D,15,D0
742 DATA A9,20,8D,F8,07,A2,80,BD
744 DATA00,43,9D,00,08,CA,10,F7
746 DATA A9,0D,8D,27,D0,A2,1F,A9
748 DATA00,95,E0,CA,10,FB,A9,00
750 DATA85,FF,A9,0A,85,FD,A9,FF
752 DATA8D,1C,D0,8D,25,D0,A9,03
754 DATA8D,26,D0,A9,07,8D,22,D0
756 DATA8D,23,D0,A9,28,85,A9,A0
758 DATA00,84,A8,98,91,A8,C8,D0
760 DATAFB,E6,A9,A5,A9,C9,40,D0
762 DATAF2,A9,34,8D,01,D4,8D,03
764 DATAD4,A9,07,8D,0C,D4,A9,61
766 DATA8D,0D,D4,8D,07,D4,8D,00
768 DATAD4,A9,81,8D,12,D4,A9,0F
770 DATA8D,18,D4,A9,FA,8D,0E,D4
772 DATA8D,0F,D4,A9,0F,8D,13,D4
774 DATA8D,14,D4,A9,00,8D,05,D4
776 DATA8D,06,D4,A9,D8,8D,16,D0
778 DATA A9,80,85,F2,A9,FF,8D,91
780 DATA02,A2,00,BD,00,44,9D,00
782 DATA20,BD,00,45,9D,00,21,E8
784 DATAD0,F1,A2,27,BD,E0,45,9D
786 DATAF8,06,BD,58,46,9D,A8,06
788 DATABD,00,46,9D,48,07,BD,30
790 DATA46,9D,98,07,A9,03,9D,A8
792 DATADA,9D,98,DB,A9,07,9D,48
794 DATADB,A9,05,9D,F8,DA,CA,10
796 DATAD3,A9,09,8D,1C,DB,A2,00
798 DATAA0,01,98,9D,F8,DA,8A,18
800 DATA69,05,AA,C8,C0,08,D0,F2
802 DATAA9,00,85,A8,AA,A9,04,85
804 DATAA9,A0,0B,A9,0B,91,A8,A0
806 DATA18,91,A8,A5,A8,18,69,28
808 DATA85,A8,90,02,E6,A9,E8,E0
810 DATA10,D0,E6,A9,0B,A2,00,9D
812 DATA00,D8,9D,00,D9,E8,D0,F7
814 DATA9D,00,DA,E8,E0,58,D0,F8
816 DATA A9,81,8D,1A,D0,AD,1F,D0
818 DATAA9,18,8D,18,D0,A9,A8,8D
820 DATA12,D0,A9,10,8D,11,D0,AD
822 DATA19,D0,09,81,8D,19,D0,A9
824 DATAFF,85,F4,58,AD,00,DC,29
826 DATA10,F0,07,AD,01,DC,29,10
828 DATAD0,F2,A9,01,85,FF,AE,25
830 DATAD0,E8,8A,29,03,8D,25,D0
832 DATAA2,06,A5,F7,F0,18,FE,A3
834 DATA07,BD,A3,07,C9,3C,F0,05
836 DATA6,F7,4C,50,48,A9,32,9D
838 DATAA3,07,CA,4C,56,48,A2,07
840 DATA A9,08,9D,4E,DB,CA,10,FA
842 DATA A9,0C,A6,FF,9D,4D,D8,A9
844 DATA0A,A2,06,9D,5E,DB,CA,10
846 DATA0A,A2,FB,A9,1C,9D,5E,07
848 DATA9D,5E,DB,A5,FF,18,69,32
850 DATA8D,1E,07,A2,05,A9,03,9D
852 DATA6C,DB,CA,10,FA,A5,F2,4A
854 DATA4A,4A,4A,4A,A9,0C,9D
856 DATA6C,DB,AD,1F,D0,29,01,D0
858 DATA03,4C,46,48,A2,00,86,F4
860 DATA A9,1F,8D,05,D4,A9,8F,8D
862 DATA06,D4,8D,01,D4,8D,00,D4
864 DATA A2,40,A9,81,8D,04,D4,A9
866 DATA01,8D,15,D0,A9,21,8D,0B
868 DATAD4,A0,FF,88,D0,FD,A9,80
870 DATA8D,04,D4,A9,20,8D,0B,D4
872 DATA8A,A8,8D,08,D4,8D,01,D4
874 DATAAD,01,D0,18,C9,96,B0,03
876 DATAEE,01,D0,A0,FF,88,D0,FD
878 DATACA,D0,C7,A5,FF,C9,07,F0
880 DATA05,E6,FF,4C,D0,48,A9,00
882 DATA8D,10,D4,A9,81,8D,04,D4
884 DATA A9,04,8D,01,D4,A9,80,8D
886 DATA04,D4,A2,07,A0,FF,86,FE
888 DATA88,D0,FB,C6,FA,D0,F5,A9
890 DATA60,85,FA,CA,D0,EE,A9,00
892 DATA85,FF,A2,00,BD,A3,07,18
894 DATADD,B8,07,D0,08,E8,E0,08
896 DATAD0,F2,4C,62,49,90,0E,A2
898 DATA07,BD,A3,07,9D,50,46,CA
900 DATA10,F7,AD,01,DC,29,10,F0
902 DATA07,AD,00,DC,29,10,D0,F2
904 DATA4C,80,46,00,00,00,00,00
906 DATA*
READY.
```

And cwikey! i

First we jolly well put everything you need to start home computing into one box.

Then we placed an obligingly low price on it all: under £140 for a computer, cassette unit, a super programming course and 4 great games programs.

Boys and girls (of all ages) will just love the Commodore 16 Starter Pack!

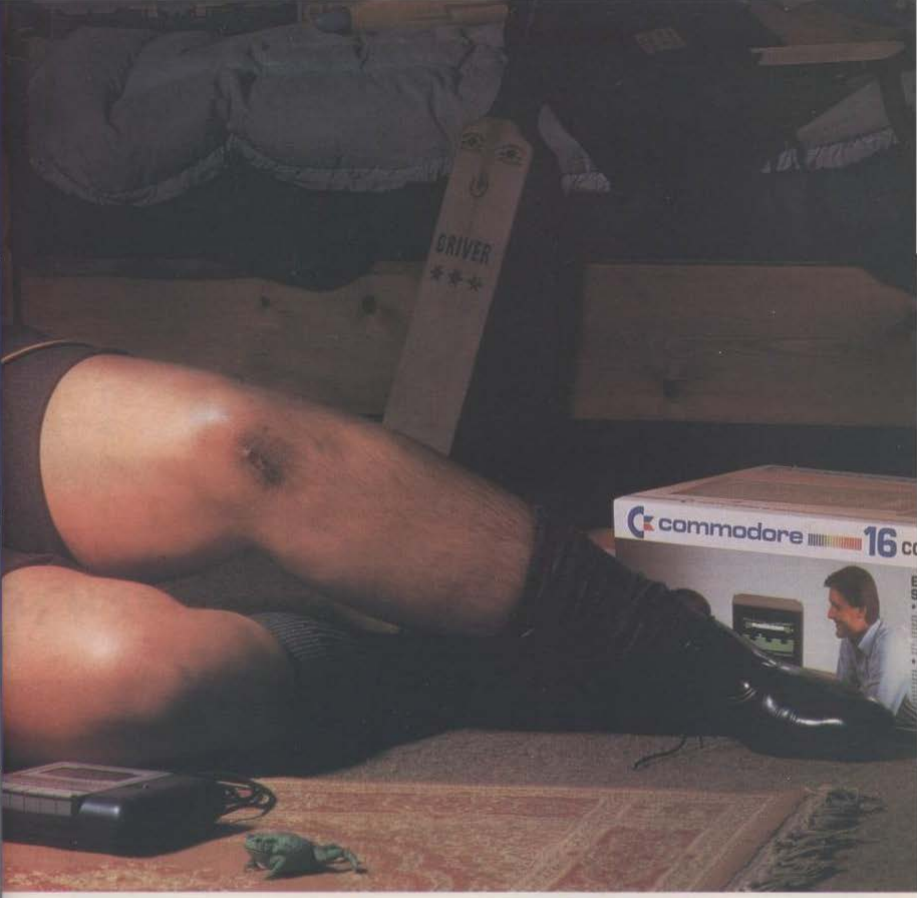
The computer has a 16K memory, real typewriter keyboard, 121 colours and also superb sound and graphics.

It uses BASIC (this is the language in which you and the computer "talk" to each other, right-ho?)

The BASIC used by the Commodore 16 is very advanced, yet really simple to use. This is because it gives you more programming commands.

But just in case any of you fellows do have any

ALLDERS · ARGOS · ASDA · BOOTS · BRITISH HOME STORES · CARREFOUR · CLYDESDALE · COMET · CO-OP · CURRYS · DIXONS · GRANADA · GREENS · LASKYS · JOHN LEWIS



t's only £139.99.

difficulties, we also provide you with a Help key.

This helps to sort out programming errors by showing you exactly where you went wrong.

So you can get more out of your Commodore 16, the Starter Pack also includes "Introduction to BASIC," a guide to programming that any silly chump can follow.

And so you can get more enjoyment, there are four jolly good and splendidly challenging games: X-Zap, Punchy, Picture Builder and Chess.

If you are thinking of starting home computing, there has never been a better time than now, with the Commodore 16 Starter Pack.

No matter what age you are, old thing.

commodore

MAKRO · MENZIES · RUMBELOWS · SAVACENTRE · SPECTRUM · SUPREME · TESCO · WALLACE HEATON · W.H.SMITH · WOOLWORTH · AND NATIONAL NETWORK OF COMMODORE DEALERS

ZOOM IS AN easy to use machine-code utility and allows the user to enlarge to full screen size the area of the screen enclosed within a window. This window can be varied in size from 8-256 pixels wide and from 3-192 pixels high. When in Magnify mode the magnified area can be viewed continuously as the window is moved. Since the magnified area can also itself be magnified, using the same window, infinite magnification is possible, even if of doubtful use. The routine does not magnify the colour but produces the magnification in the current permanent attribute colour.

The routine accesses various Basic variables for its parameters. This means you do not have to bother Poking any numbers, but just use a Let statement. If you call the routine without having assigned the following variables a "2 Variable not found" error will be given.

The machine code has comprehensive error checking. Zoom will not allow XPOS or YPOS to be values that make a part of the window off screen. If say, XPOS was 270, an illegal screen co-ordinate, Zoom would give XPOS a new value that ensured that the window was entirely on the screen, this value would vary with the size of the window. The width of the window can have values between 0 and 5, the depth can have values between 0 and 6. If the variables Width or Depth have values that are too big Zoom will change the value to the maximum permissible value. Likewise if either has a negative value Zoom will replace the value with 0. The width and depth numbers correspond to the following window sizes:

Width	Depth
0 256 Pixels	192 Pixels
1 128	96
2 64	48
3 32	24
4 16	12
5 8	6
6 —	3

Thus to have a window size 64 pixels by 12 pixels, Width would be 2 and depth would be 4. If you wish to see an example of Zoom error correcting, load up with the Zoom code and then run the following lines of Basic.

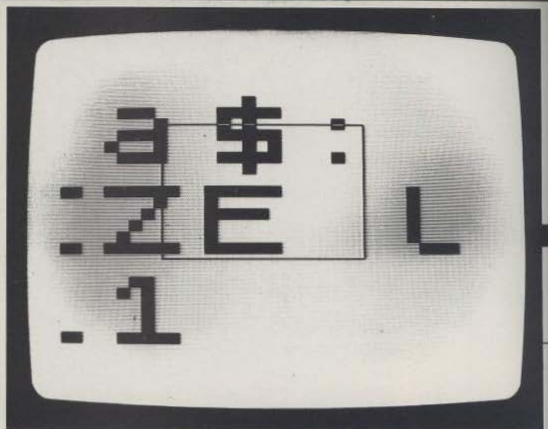
```
10 LET XPOS = 260: LET YPOS = -10
20 LET WIDTH = 6: LET DEPTH = -5
```

Having run the program type

```
RAND USR 50000
```

This will draw the Zoom window. In this case you will see a very tall, thin window. If you now type Print XPOS, YPOS, Width, Depth you will find that Width = 5, Depth = 0, XPOS = 248 and YPOS = 192. Since XPOS and YPOS denote the top left corner of the window, YPOS has been made 192 since the window is 192 pixels high i.e., this is the first value of YPOS above −10 that allows the window to appear/sit on the screen. XPOS has been rounded down until the window is on the screen, in this case 256-window width.

The algorithm used for Zoom takes each line of the window, places it in a buffer and keeps on doubling it in width until it is 32 bytes wide. It then puts the 32-byte buffer down on the screen — 192/(window y size) — times. The initial form of the screen is saved at 32768 and the magnified image is formed on the normal screen ie., at 16384. To create Zoom, type in program A and then save it. Now try running it, if you have no errors, then save the code. The code can be used independently of program B, this program is provided to help you use Zoom.



Basic program commands.

A ... Clear main screen and back-up.
B ... Move back-up screen down to current window screen.
L ... Load with new back-up screen.
m ... Magnify area under window until next key press.
M ... Continuously magnify. View can be moved around using normal direction keys.
N ... Retrieve back-up screen.
P ... Make magnified image current window screen.
s ... Alter window movement step size.
x ... Increase window width.
X ... Decrease window width.
y ... Increase window depth.
Y ... Decrease window height.

Machine-code routines.

Address
30000 XOR current window onto screen. Doing this twice will delete the window
30003 Move screen from 32768 to 16384
30011 Move screen from 16384 to 32768
30019 Move screen from 39680 to 16384
30027 Move screen from 16384 to 39680
30039 Magnify area under window

The area 50708-50800 is used as workspace by Zoom and should be left clear.
32768-39679 Used to store screen during magnification.
39680-46591 Used to store back-up screen

Program A.

```
  10 DATA "c373c421000011004018l
621004011000b21000ed5b110040180
621004011009b01001bedb0c9cd09c53
a8f5c5c5f210058001000372830b78b120f
97a5fc84/0503c0049130fc357325
9c03a55c6/5a7200143e201807cb37cb3
/cb37c3258c6r106ff"
  11 DATA 13400
  20 DATA "04f600280378f8783285
7c6ed4b53c6cdd7c4328a c63e4084678
b210040338b1c6af;5d5c5cd02c4dd3a5
9c647c5d52113c602000ed5b61cd6ac
4ebc110ee61cd6ac4ebc110db3a58c64
/06000c9cd46c43a57c647f7c8c52113c
61133c601001c574ee5"
  21 DATA 13621
  30 DATA "61e6a7280/060817/5cb1
5cb1/fcb15cb1410/3e7223723e5e
123c110de2133c61113c601000e5b0f
110c6c9eb3a58c647/1113c6050e0e5b03
a58c647c5b6280/13c28cb168b10f53d1
0f1a5e0744c0/1a2c6205/a57c5b0567c
9c0c9c5ed4b53c8cdd7"
  31 DATA 13875
  40 DATA "c41e/f16000e80a747280
8c63bcb1acb3910/8e5c5cd8c4cb210
0003e01db3a58c8cdae4c4c1e13a58c63
dcdae4c4cd8c4/6477e8977cd6c4410/
8c93a55c6a7200140620187cb3/cb3/c
b37477e8b772/cb7b20003fe8a7710/3c
93e4c7c5222a5c5ce5"
  41 DATA 14484
```

```
  50 DATA "ed535d5cdb225da2e1c2
3cdb4330e1225d5c/978706/733a79706
/733d6e6570706b3d776965746803d110
3c5fdc/c4c4ea2c7920043e201b0280
3b/1806/e0b3b03e3b5/51103c5cde0c
5/15/16002106c5197e3255c611/dc4c
dd5c4/dd5a2c7920043e"
  51 DATA 13530
  60 DATA "05180c2803a/1807fe07d
a5bc53e05/511/dc4cde0c5/15/16002
10c6197e3255c611/5c4cdd5c4/dd5a2
d3000301c2020301000c5e13a55c63
c5/1600ed5b3000ed57b11/5c4cde0c5c
1c5e111c100e/52380a1bd57b11/5c4c
de0c5c1179/511/3c4cd"
  61 DATA 13805
  70 DATA "dc4c4cda22d2805110001
81d3000312c01c5e13a55c6a72005110
000180b573600925/1600ed5b3000ed57
b11/3c4cde0c5c/1c1e1b92a57c6a92a5d
c5ed5b3b55c/d2a5d/d2a2d/d3b7003
003c32e1c2a45c6d437a5c6a1225d5c5
d/f2a5900b04a001008"
  71 DATA 13307
  80 DATA "c06030180c0603"
  81 DATA 801
5000 LET r=50000
5010 FOR n=1 TO 8: READ a$
5011 LET c=0
5020 FOR i=1 TO LEN a$ STEP 2
5030 LET a=CODE a$(i): LET b=COD
E a$(i+1)
5040 LET c=c+b+8
5050 IF a>96 THEN LET a=a-39
```

ZOOM

Mark Jones takes you up, up and away . . . with his instant enlarger for the bleary-eyed Spectrum.

Variables.

XPOS	X co-ordinate of window
YPOS	Y co-ordinate of window
WIDTH	Width of window 0-5
DEPTH	Depth of window 0-6

```
5060 IF b>96 THEN LET b=b-39
5070 LET a=a-48
5080 LET b=b-48
5090 POKE f,a+16+b
5100 LET f=f+1
5110 NEXT s
5111 PRINT "Line ";h*10;" is O.K
."
5120 READ tot: IF tot<>c THEN PR
INT "Error at line ";h*10: STOP
5125 LET c=0
5130 NEXT h
5140 PRINT "No Errors"
5150 PRINT "Save code from addre
ss 50000,  length 708 bytes."
```

Program B. Demonstrates how little external control the machine code needs.

```
   5 LET width=1: LET depth=1
  10 LET xpos=100: LET ypos=100
  20 LET a=1
  30 LET mod=0
  40 LIST 1500   REM Put somethin
g on the screen
 100 GO SUB 1500
 110 IF INKEY$="" THEN GO TO 110
 115 IF NOT mod THEN RANDOMIZE U
SR 50000
 120 GO SUB 1000
 140 GO TO 100
 500 REM ******************
1000 LET tot=xpos+ypos
1005 LET xpos=xpos+a*((INKEY$="8
")-(INKEY$="5"))
1010 LET ypos=ypos+a*((INKEY$="7
")-(INKEY$="6"))
1020 IF xpos<>ypos<>tot THEN RETU
RN
1025 REM ******************
1030 RANDOMIZE USR 50011: REM
     (save screen temporarily.)
1040 LET depth=depth+(INKEY$="Y"
)-(INKEY$="y")
1050 LET width=width+(INKEY$="X"
)-(INKEY$="x")
1070 IF INKEY$="m" THEN RANDOMIZ
E USR 50039: PAUSE 0: PAUSE 0
1075 IF INKEY$="M" THEN LET mod=
1-mod: GO SUB 1400
1080 IF INKEY$="A" THEN INPUT "C
onfirm Y/n ? ";a$: IF a$="Y" THE
N CLS : RANDOMIZE USR 50027: RAN
DOMIZE USR 50011
1085 IF INKEY$="P" THEN RANDOMIZ
E USR 50039: RANDOMIZE USR 50011
1090 IF INKEY$="N" THEN RANDOMIZ
E USR 50019: RANDOMIZE USR 50011
: LET mod=0
1100 IF INKEY$="S" THEN INPUT "S
tep size ? ";a: IF a<1 OR a>255
THEN GO TO 1100
1101 REM ******************
1102 REM Use one or other of
these two versions.
1103 REM ******************
1104 REM Microdrive Version
1105 IF INKEY$="L" THEN INPUT "S
creen to be loaded ? ";a$: IF a$
="" THEN LOAD ""a$": a$CODE 396
00: RANDOMIZE USR 50019: RANDOMI
ZE USR 50011
1106 REM ******************
1107 REM Tape Version
1108 IF INKEY$="L" THEN INPUT "S
creen name ? ";a$: IF a$<>"exit"
THEN LOAD ""CODE 39600: RANDOMI
ZE USR 50019: RANDOMIZE USR 5001
1
1109 REM ******************
1110 IF INKEY$="B" THEN INPUT "A
re you sure (y/n) ";a$: IF a$=
"y" THEN RANDOMIZE USR 50003: RA
NDOMIZE USR 50027
1120 RANDOMIZE USR 50003: REM
     (Retrieve screen.)
1125 RETURN
1399 REM ******************
1400 IF mod THEN RANDOMIZE USR 5
0011: RETURN
1405 RANDOMIZE USR 50003: RETURN

1499 REM ******************
1500 IF NOT mod THEN RANDOMIZE U
SR 50000: RETURN  REM
     (Window Mode.)
1510 RANDOMIZE USR 50039: REM
     (Magnify Mode.)
1520 RETURN
1999 REM ******************
2000 CLEAR 32767: LOAD ""CODE
```

ALL HANDS ON DISK. NOW.

Einstein from TATUNG. Sheer genius from around £499. The complete colour micro with no hidden extras. And with no hidden software, unlike some other new computers.

Right now you can get your hands on both Einsoft and Einsoft Approved Software. An immediately available range that's every bit as versatile as Einstein itself. "Einsoft" is our own software, designed and prepared for Einstein by TATUNG.

Einsoft 'APPROVED'

Kuma, Crystal Research, Digital Research and Solo are some of the country's leading software houses now writing superb software packages for Einstein, and TATUNG has complete confidence in recommending those packages which bear the "Einsoft Approved" seal.

So from today you can explore the genius of Einstein with software covering a tremendous range of applications. From word processing, database and home economics to education, languages and games. And there's plenty more coming all the time.

Einstein from TATUNG. Sheer genius at home. At work. At school.

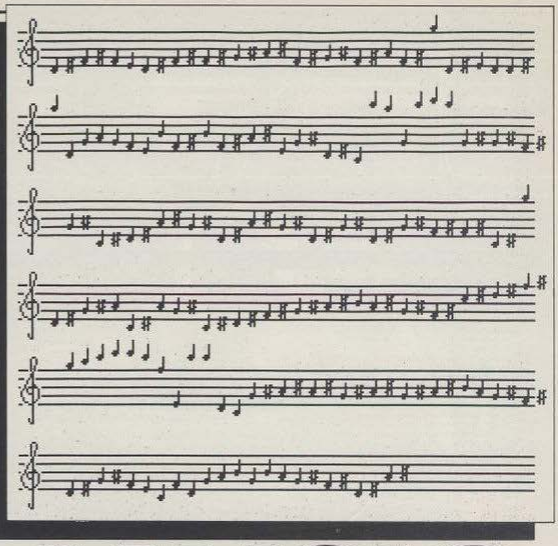
And now at your local stockist.

TATUNG Einsoft

DIAL 100 AND ASK FOR FREEFONE EINSTEIN FOR YOUR NEAREST STOCKIST.

BBC MUSIC

Complete that unfinished symphony with Nick Lea's masterly BBC composition.



THIS PROGRAM will only run on a BBC 1.2 operating system with Basic 2 mainly because the word "OSCLI" is used. To check whether the computer you use is suitable, type:

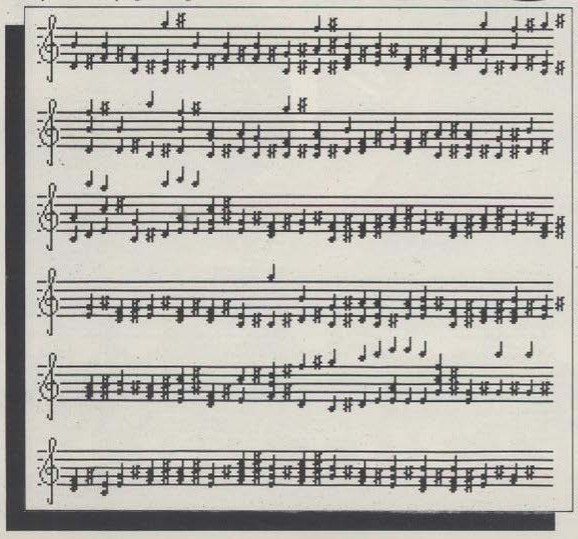
OSCLI("FXO") (RETURN)

If no error message is produced then this program should run.

The program is a tool for use in the writing, development or simple playback of music. It uses the BBC's three pitch channels to produce a possible three-line tune with simultaneous screen and sound note output. Also included in the program are routines to save and load tunes to or from tape, making it possible to store away a masterpiece you are particularly pleased with. For the musically uninitiated, or the plain lazy, there is a harmonisation routine which generates pseudo-random harmonies to a tune entered.

In its entirety — well, in this un-REM-ed version — the program is rather long and may seem an effort to type in all in one go.

If certain procedures are left out, the program will run, until a non-existent option is selected, and if found to be useful, they can be added at a later date. The advantage of this is that it initially halves the program length.



The parts of the program which are optional to the main function are:

Line number	Procedure	Effect of losing it
2280	Procspeed	will not be able to change speed of playback
2A10	Procpitch	will not be able to change pitch of playback
25A0	Procsave	will not be able to save a tune to tape
2790	Procload	will not be able to load a tune from tape
3130	Procharmonise	will not be able to use the computer harmonise

Once the program — or section of the program — has been entered in the normal fashion, it can be run. This will produce a menu sheet with nine options open to the user. They are:

1. Play tune in memory.
2. Enter or edit a tune.
3. Change playback speed.
4. Change pitch of playback.
5. Save a tune onto tape.
6. Load a tune from tape.
7. Harmonise a tune in memory.
8. Clear memory.
9. Exit program.

When first run, there is no tune in the computer's memory. One can be entered using option 2, selected by just pressing 2. Option 2

(continued on next page)

(continued from previous page)

produces an instruction sheet which sets out the keyboard of a piano on to the BBC keyboard with the form as shown in table 1.

It shows how to change the lengths of notes using Shifted function keys. Three lines of music can eventually be built up so the line about to be used is asked for. A musical stave is then printed up and the tune can be entered. Return ends the tune and displays the menu sheet again. Selecting option 1 will now play the tune just put into the memory at its correct tempo. Tunes of up to 300 notes can be used and up to three can be played at once. The routines to change playback speed and pitch are self-explanatory and simply alter the global variables: Del% and Oct%.

| | | |

BBC MODEL B 1·2 OS

JETPAC

ULTIMATE
PLAY THE GAME

Available from W.H.Smith, John Menzies, Boots, Woolworths, and all good software retailers.
Also available from Ultimate Play The Game, The Green, Ashby-de-la-Zouch, Leicestershire LE6 5JU

£7·95

(continued from page 110)

```
2460 IF A%=85 THEN PRINT"Up" ELSE PRINT
"Down"
2470 INPUT"By how many semitones [numbe
r,return]",Q%
2480 Q%=Q%+SGN(A%-75)*4
2490 IF Q%<OCT%>0 AND Q%+OCT%<150 THEN
OCT%=OCT%+Q%:ENDPROC
2500 PRINT"That pitch change is too lar
ge"
2510 REM small delay
2520 Q%=INKEY(100)
2530 ENDPROC
2540 REM==============================
2550 DEFPROCsave
2560 CLS
2570 PRINT:PRINT"     Saving a tune on
to tape"
2580 PRINT"          ------------------
"
2590 IF NOT FNyesno("Are you sure") THE
N ENDPROC
2600 PRINT:PRINT"Please make sure that-
"
2610 PRINT"1........A tape recorder is
connected"
2620 PRINT"2........The levels are corr
ectly set"
2630 PRINT"3........A usable tape is in
side"
2640 PRINT:PRINT"Filename of tune (max
length of 10)"
2650 INPUT">",F$
2660 IF LEN(F$)>10 THEN 2640
2670 file=OPENOUT F$
2680 FOR I=1 TO J
2690 Q%=TUNE*(I-1)*300-1
2700 REPEAT
2710        Q%=Q%+1
2720        BPUT# file,?Q%
2730 UNTIL ?Q%=0
2740 NEXT I
2750 CLOSE# file
2760 PRINT"File saved.Please stop the t
ape."
2770 Q%=INKEY(200)
2780 ENDPROC
2790 REM==============================
2800 DEFPROCload
2810 CLS
2820 PRINT:PRINT
2830 PRINT"  Loading a tune from tape"
2840 PRINT"  ------------------------"
2850 PRINT:PRINT
2860 IF NOT FNyesno("Are you sure") THE
N ENDPROC
2870 PRINT:PRINT"Please make sure that-
"
2880 PRINT"1........A tape recorder is
connected"
2890 PRINT"2........The levels are cor
rectly set"
2900 PRINT
2910 INPUT"Filename",F$
2920 IF LEN(F$)>10 THEN PRINT"Can't be
longer than 10 characters":GOTO 2910
2930 file=OPENIN F$
2940 FOR I=1 TO J
2950 Q%=TUNE*300*(I-1)-1
2960 REPEAT
2970        Q%=Q%+1
2980        ?Q%=BGET# file
2990 UNTIL ?Q%=0
3000 NEXT I
3010 CLOSE# file
3020 PRINT"File loaded"
3030 Q%=INKEY(200)
3040 ENDPROC
3050 REM==============================
3060 DEFFNyesno(A$)
3070 PRINT:PRINT A$+"(Yes/No)?";
3080 REPEAT
3090        A%=GET
3100 UNTIL A%=89 OR 78
3110 IF A%=89 THEN PRINT"Yes" ELSE PRIN
T"No"
3120 =(A%=89)
3130 REM==============================
3140 DEFPROCharmonize
3150 CLS
3160 PRINT:PRINT
3170 PRINT"      H A R M O N I Z I N G"
3180 PRINT"      ^^^^^^^^^^^^^^^^^^^^^"
3190 PRINT:PRINT
3200 PRINT"  This harmonization routine
requires"
3210 PRINT"  that the tune to be harmon
ized is"
3220 PRINT"  is put onto LINE 1."
3230 PRINT"  The computer will then gen
erate "
3240 PRINT"  harmonies on LINES 2 & 3."
3250 PRINT:PRINT
3260 IF ?TUNE<>0 THEN 3350
3270 PRINT"     There is no tune on LIN
E 1."
3280 PRINT:PRINT"          Please put one
on"
3290 PRINT"          ^^^^^^^^^^^^^^^^^^"
3300 PRINT"  (Press [Space bar] to retu
rn to menu)"
3310 REPEAT
3320        A%=GET
3330 UNTIL A%=32
3340 ENDPROC
3350 PRINT"   Is the tune currently on
LINE 1"
3360 IF NOT FNyesno("    to be harmoniz
ed") THEN 3280
3370 PRINT:PRINT"If the keyboard is arr
anged-"
3380 PRINT"  S D   G H J"
3390 PRINT" Z X C V B N M"
3400 PRINT:PRINT"then press the note co
rresponding to"
3410 PRINT"          the key  >"
3420 REPEAT
3430        A%=GET
3440        ?key=A%
3450        CALL proc
3460 UNTIL ?key<>0
3470 S%=(?key-1) MOD 12
3480 PRINT:PRINT"The key of harmonizati
on is ";S%+1;" keys."
3490 PRINT"          up the keyboard"
3500 PRINT:INPUT"Major or Minor(MAJ/MIN
)";A$
3510 IF A$<>"MAJ" AND A$<>"MIN" THEN 35
00
3520 IF A$="MIN" THEN S%=(S%+3) MOD 12
3530 REM+++++HARMONIZATION++++
3540 POINTX=TUNE
3550 BASS%=1
3560 REPEAT
3570        PITCH%=?POINTX AND 31
3580        NX=(?POINTX AND 224) DIV 32
3590        SC%=(PITCH%+12-S%) MOD 12
3600        IF SC%=0 THEN SC%=12
3610          DIFF%=12
3620          FOR I%=1 TO 4
3630          HX=ABS(HX(SC%,I%)-(-BASS%)
3640          IF HX<DIFF% THEN VX=I%:DIF
F%=HX
3650          NEXT I%
3660          BASS%=HX(SC%,VX)
3670          H1%=BASS%+S%:IF H1%>12 THE
N H1%=H1%-12
3680          VX=VX+(RND(2)*2)-3:IF VX=0
THEN VX=2
3690          IF VX=5 THEN VX=3
3700          HZ%=HX(SC%,VX)+6%
3710          IF HZ%<H1% THEN HZ%=HZ%+12
3720          IF RND(4)=1 THEN RX=1 ELSE
RX=0
3730          ?(POINTX+300)=32*NX+H1%
3740          ?(POINTX+600)=32*NX+RX*H2%
+(1-RX)*H1%
3750        POINTX=POINTX+1
3760 UNTIL ?POINTX=0
3770 ?(POINTX+299)=32*NX+S%+1:?(POINTX+
599)=32*NX+S%+8
3780 ?(POINTX+300)=0:?(POINTX+600)=0
3790 CLS
3800 PRINT"HARMONIZATION COMPLETE"
3810 PRINT"^^^^^^^^^^^^^^^^^^^^^^^^^^^
3820 A%=INKEY(100)
3830 ENDPROC
```


ROBOTICS SPECIAL

16 page pull-out supplement
*Buyer's guide to personal robots currently on the market
*The technology of small robots

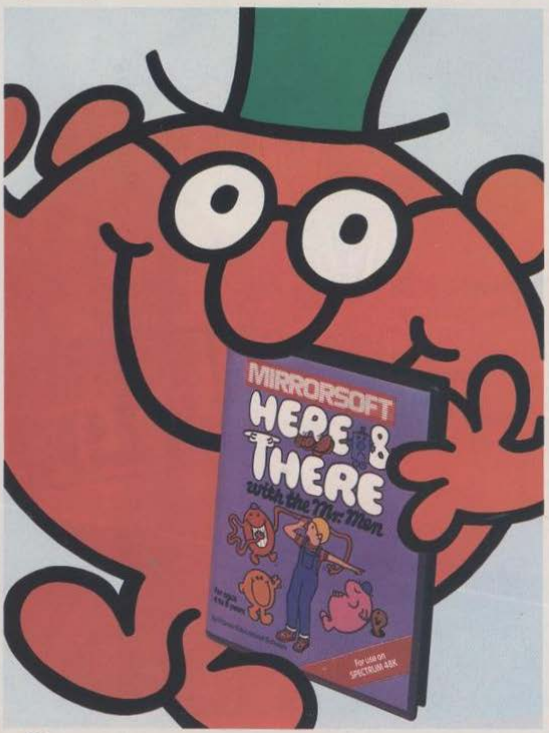
*Small robots and their big brothers

Plus **ALFRED THE ROBOT**
Build an educational mini robot from an inexpensive D.I.Y. kit.

Introduce your kids to another friendly teacher.

The Mr. Men and friends, have all gone back to school. They're learning a lot. So they can help youngsters, from 4 upwards, to an enjoyable start on the rudiments of reading, and the basics of arithmetic.

There are games for keen-eyed youngsters to sharpen observation, and games to help unravel the mysteries of left and right. They're ideal for home use, nursery and primary schools.



HERE & THERE WITH THE MR. MEN

Telling left from right, and working out simple routes can confuse young children. In these four games they learn by giving directions to the Mr. Men. Watching what happens on screen is fun. The games progress in difficulty as the children get more expert.

For 5 to 8 year olds. On cassette for the Spectrum 48K, BBC B and Electron. **£7.95**

WORD GAMES WITH THE MR. MEN

Some sorts of words can cause difficulty for children just starting to read. This double cassette pack takes an amusing look at comparatives and superlatives. It also has fun with opposites and keeps Mr. Bounce leaping about with positional adverbs. Fourteen games in all. Includes keyboard overlay and illustrated book.

For 5 years upwards. On cassette for the Spectrum 48K. **£9.95**

Also available: First Steps with the Mr. Men – games for pre-readers. On cassette for the BBC B, Electron, CBM64 and Spectrum 48K. **£8.95**

COUNT WITH OLIVER

Two games in which cheeky young Oliver learns to count and do simple sums. Choosing different toys in various colours requires single digit answers from the players.

Next greedy Oliver asks for lollipops and adds up different shapes and colours. Subtraction is achieved when Oliver devours the lollipops. He swells visibly and his fate will delight young children.

For 4 to 7 year olds. On cassette for the CBM64, Spectrum 48K, BBC B and Electron. **£7.95**

LOOK SHARP!

Two programs with seven games to test and train children's powers of observation in an amusing way. On Old MacDonald's farm they sort the sheep from the geese and the cows from the pigs. The games are Memory, Odd-one-out and Snap.

SORT, the second program, is a space observer's test with a variety of space scenes to scan and remember.

For 3 to 11 year olds. On cassette for the CBM64, Spectrum 48K, BBC B and Electron. **£7.95**

QUICK THINKING!

Two futuristic, arithmetical mind stretchers. In SumVaders aliens in numbered space ships drop numbered robots. Correctly added or subtracting the two numbers destroys the robot. If you are wrong or late the robot lands. Correct answers are displayed. Five levels of difficulty.

Robot Tables puts the player in charge of a robot making machine. Maximum robot output is only achieved by mastering multiplication tables to give the correct instructions to the machine.

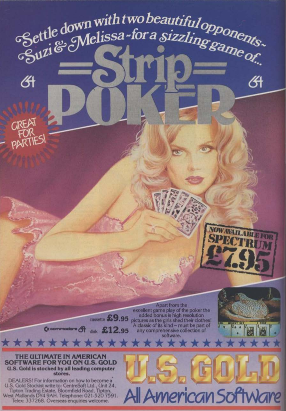
For 7 years to adult. On cassette for the CBM64, Spectrum 48K, BBC B and Electron. **£6.95**

All CBM64 and BBC B versions are available on disk.

MIRRORSOFT

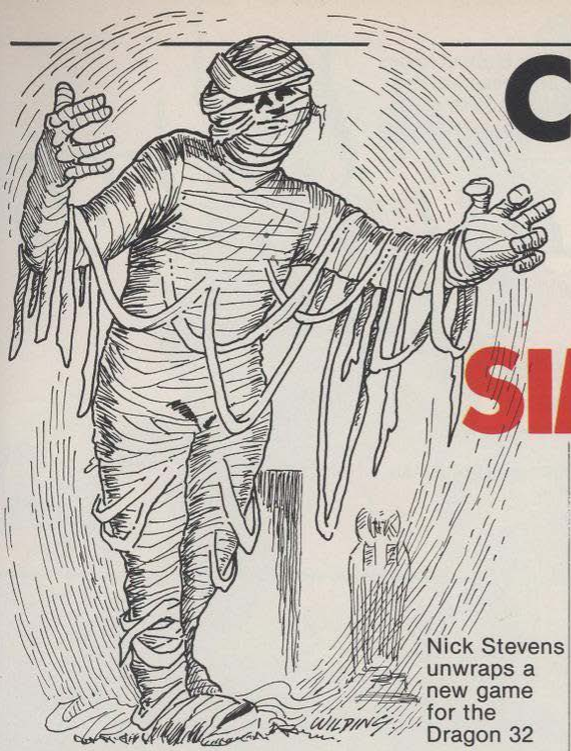
SOFTWARE FOR ALL THE FAMILY

Available from Boots, W.H. Smith, Spectrum and all good software stockists. Write for a free catalogue to: Mirrorsoft, Holborn Circus, London, EC1P 1DQ.



Settle down with two beautiful opponents~
Suzi & Melissa ~ for a sizzling game of...
Strip
POKER
64
64
GREAT FOR PARTIES!
NOW AVAILABLE FOR SPECTRUM
£7.95
Apart from the excellent game play of the poker the added bonus is high resolution pictures as the girls shed their clothes! A classic of its kind – must be part of any comprehensive collection of software.
cassette £9.95
commodore 64 disk £12.95
THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD
U.S. Gold is stocked by all leading computer stores.
DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591. Telex: 337268. Overseas enquiries welcome.
U.S. GOLD
All American Software

CURSE OF ABU SIMBEL



Nick Stevens unwraps a new game for the Dragon 32

THE CURSE of Abu Simbel is an adventure game written for the Dragon 32. The object of the game is to find the Golden Mask of Abu Simbel — but beware of the Curse!

The game uses the standard Verb-Noun input format but with a few extras — pushing Shift and an arrow key will abbreviate the direction commands. For example, pressing Shift and up arrow will print Go North, press Enter to input.

Also, when getting an object, you can use It to refer to the object. Other features of the game are split screen scrolling, a real-time clock, a diagram of current exits and sound.

The Dragon's sound command has been redefined for extra flexibility. The new format is Sound N,N — where N is any number between 1 and 65535. The second number now refers to number of cycles and the first is the pitch. The real-time clock is displayed at the top of the screen along with a compass and the room's exits.

First type in listing 1 and Save at the start of a blank tape. This program sets up the sound, clock and scroll routines, it also loads and runs the main program. Second type in listing 2. Do not attempt to run this program without first running listing 1, as it calls the machine-code routines set up in listing 1.

To aid debugging it would be useful to miss out lines 5 and 6 until the program is fully working. These lines disable the Break key, List and LList functions.

Now Save this program after the first by:

GOTO 9000

This will Save and autorun the program.

I will supply a copy of the program for £2.50. Please send a blank cassette and an S.A.E. to: Nick Stevens, 8 Hope Place, Musselburgh, East Lothian EH21 7QE.

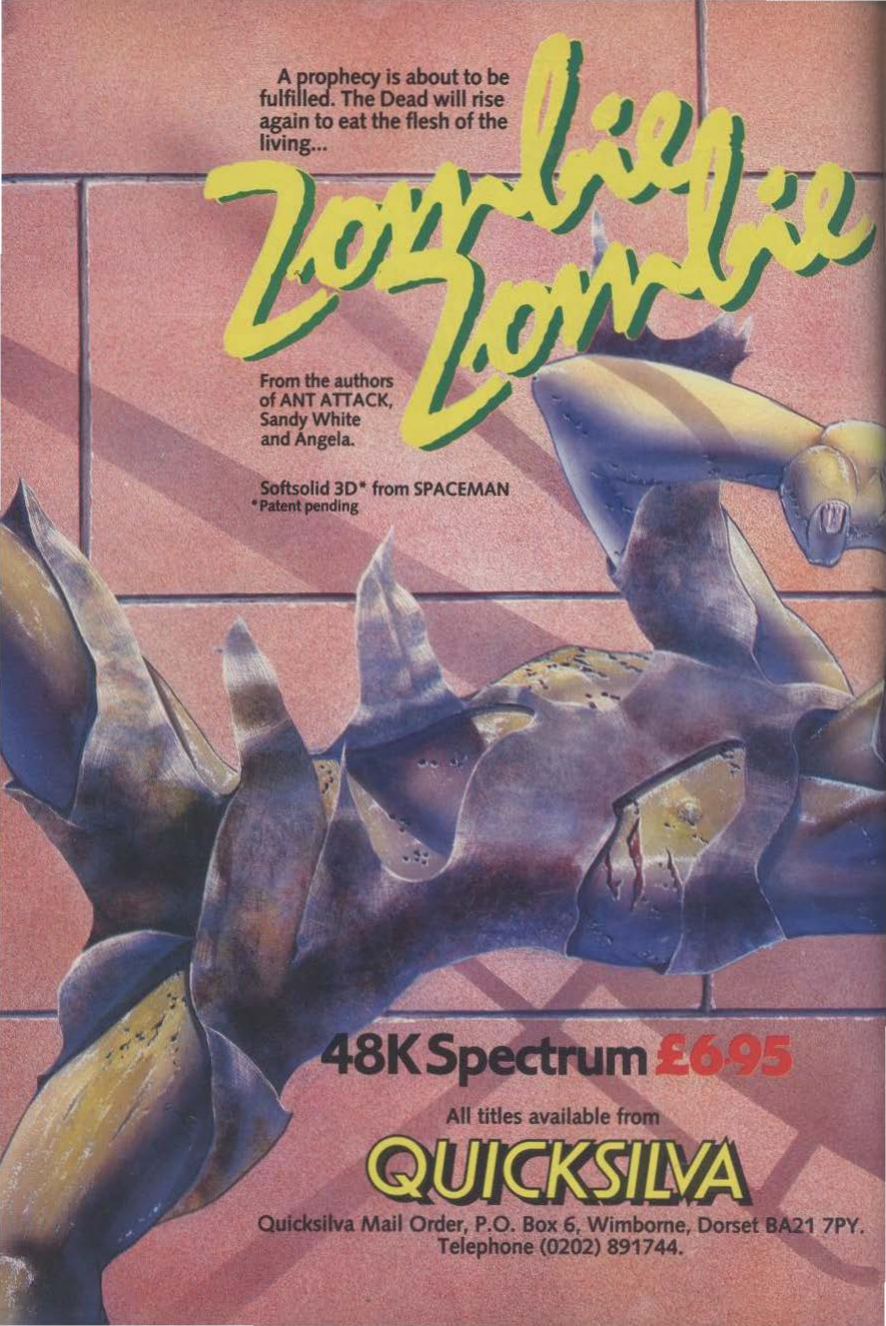
Listing 1.

```
10 CLEAR500,31999:CLS:PRINT@38,"PLEASE WAIT A MOMENT."
20 PCLEAR1
30 X=32000
40 READA$:IF A$="END" THEN 60
50 POKEX,VAL("&H"+A$):X=X+1:GOTO40
60 EXEC32000
70 EXEC32141
80 PRINT@134,"LOADING MAIN PROGRAM."
90 CLOADM
100 DATA10,8E,7E,67,8E,80,33,10,BF,01,21,A6,80,A7,A0,8C,81,CA,25,F7,8E,7F,88,BF,
01,23
110 DATA8E,7D,21,BF,7F,CC,39,34,36,BD,8E,83,27,15,BF,01,44,35,36,BD,89,AA,34,36,
BD,8E,83
120 DATABF,01,46,BD,00,A5,27,07,35,36,C6,02,7E,83,44,B6,FF,03,84,FE,B7,FF,03,B6,
FF,23,8A,08
130 DATAB7,FF,23,B6,FF,01,84,F7,B7,FF,01,10,BE,01,46,86,FD,B7,FF,20,BE,01,44,30,
1F,26,FC,7F,FF,20
140 DATA8E,01,44,30,1F,26,FC,31,3F,26,E6,B6,FF,23,84,F7,B7,FF,23,B6,FF,03,8A,01,
B7,FF,03,35,36,39
150 DATA30,CC,51,6F,84,6F,82,86,3B,A1,82,24,02,6F,84,86
160 DATA17,A1,82,24,02,6F,84,30,CC,08,BF,01,0D,39,8E,9D
170 DATA3D,BF,01,0D,39,30,CC,2C,6C,84,86,32,A1,84,26,1E
180 DATA6F,84,6C,82,86,3C,A1,84,26,14,6F,84,6C,82,A1,84
190 DATA26,0C,6F,84,6C,82,86,18,A1,84,26,02,6F,84,7E,9D,3D,00,00,00,00
200 DATA8E,04,A0,A6,88,20,A7,80,8C,05,DF,26,F6,39
210 DATA END
```

Listing 2.

```
5 POKE&H19B,6:POKE&H19C,&H7E:POKE&H19D,&HB4:POKE&H19E,&HA4:POKE&H19A,&H35
6 POKE383,158:POKE157,125:POKE158,0
10 R=12:I=0:NU=1:CR=1:F=0:IFP=0:T=0:M=0:MM=0:L=0:G=0
20 DIMR$(68),V$(31),N$(22),D$(68,3),MP(25)
30 CLS:
40 FORA=0 TO 24 STEP2:PRINT@A,CHR$(172)|CHR$(236)|:NEXTA:PRINTSTRING$(6,128)|
50 PRINT@32,STRING$(128,128)|
60 PRINT@34,"a"|PRINT@45,"m e"|:PRINT@98,"a"|:POKE1090,42
70 PRINT@43,"time"|:POKE1071,61
80 PRINT@73,CHR$(177)|STRING$(8,179)|CHR$(178)|
90 PRINT@105,CHR$(181)|"00:00:00"|CHR$(186)|
100 PRINT@137,CHR$(180)|STRING$(8,188)|CHR$(184)|
110 PRINT@84,"exits"|:POKE1113,58
120 PRINT@60,CHR$(206)|CHR$(204)|CHR$(205)|
130 PRINT@92,CHR$(202)|CHR$(128)|CHR$(197)|
140 POKE1504,149
150 PRINT@124,CHR$(203)|CHR$(195)|CHR$(199)|
160 SOUND2000,10
170 PRINT@54,"DOUBLE SPEED ?";
180 A$=INKEY$:IF A$="" THEN180
190 IF A$="Y" THEN PRINTCHR$(8)|"Y"|:POKE65495,0 ELSE IF A$="N" THEN PRINTCHR$(8
)|"N"|:POKE65494,0 ELSE GOTO 170
200 SOUND20,60
210 A$=INKEY$:IF A$=CHR$(8) THEN SOUND30,80:GOTO170 ELSE IF A$=CHR$(13) THEN SOU
ND80,30:GOTO 220 ELSE 210
220 FORA=1 TO 4:EXEC32226:NEXTA
```

(continued on page 119)


A prophecy is about to be fulfilled. The Dead will rise again to eat the flesh of the living...
Zombie Zombie
From the authors of ANT ATTACK, Sandy White and Angela.
Softsolid 3D* from SPACEMAN
*Patent pending
48K Spectrum £6.95
All titles available from
QUICKSILVA
Quicksilva Mail Order, P.O. Box 6, Wimborne, Dorset BA21 7PY.
Telephone (0202) 891744.

48K Spectrum games

Blood & Guts

A fantastic fight to the death within your own bloodstream!

48K Spectrum £6.95

Strontium the Dog Killing

A battle to the end with the deadliest killers in the Galaxy!

48K Spectrum £6.95

48K Spectrum £6.95 each

WHSMITH John Menzies

WOOLWORTH

and leading multiple retailers and specialist computer stores.

WARNING: These programs are sold according to QUICKSILVA Ltd's terms of trade and conditions of sale, copies of which are available on request.

MAY WICO BE WITH YOU

When you're up against all the evil in the universe, you need the finest joystick. Weak, sticky, slow controls can only lead you to your doom.

You need a Wico.® The controls in more than 500 modern arcade games are actually made by Wico.® They set the industry standard for durability and performance. And the same arcade quality goes into the Wico® you take home.

Wico® joysticks work directly with the Commodore 64,™ Vic 20,™ all Atari® Home Computers and Atari® Video Games.

Add an interface, and you can connect into a Sinclair Spectrum or Apple II® and IIe.® If you have a new MSX computer there's the just released MSX Grip Handle for you.

What do you get? A man-sized handle on a virtually unbreakable shaft. Tough, ultra-sensitive Wico® switchgear. A heavy-weight base. A year's guarantee. And more sheer dodging, chasing and blasting power than ever before.

The Wico® range includes the famous Red Ball,™ straight out of the arcades. The Three Way Deluxe with interchangeable handles. The light but rugged Boss. And check out the state-of-the-art Trackball: many owners use it for serious programming, where it gives them effortless cursor control.

Ask your dealer to let you handle a Wico.® Quality (you'll find) costs money.

But if you want to have less trouble fighting your controls, and more power for fighting the forces of darkness . . . only Wico® is worthy of your hand.

WICO®

THE FINEST HAND CONTROLS IN THE KNOWN UNIVERSE

CGL HOUSE, GOLDINGS HILL, LOUGHTON, ESSEX IG10 2RR. 01-508 5600. LOOK FOR THE WICO NAME IN ALL GOOD SHOPS AND CATALOGUES.

(continued from page 115)

```
230 SOUND400,20
240 PRINT#452,"PLEASE WAIT!"
250 EXEC32226
260 READA(FORA+1 TO 4)READA:A=A:NEXTA
270 READR(5)
280 FORA=6 TO 9:R(A)=A:NEXTA
290 FORA=10 TO 16:READR(A):NEXTA
300 SOUND400,20:EXEC32226
310 FORA=1 TO 48
320 FORB=0 TO 3
330 READIA,B)
340 NEXTB,A
350 SOUND400,20:EXEC32226
360 FORA=1 TO 31:READR(A):NEXTA
370 SOUND400,20:EXEC32226
380 FORA=1 TO 22:READW(A),NP(A):NEXTA
390 SOUND400,20:EXEC32226
400 FORA=1 TO 5:EXEC32226:SOUND20,50:NEXTA
410 POKE32272,0:POKE32273,0:POKE32274,0
420 GOSUB3570
430 A=RND(0):GOSUB3580
435 IF A=0 THEN GOTO 435
440 FORA=1 TO 22:IF NP(A)=R THEN PRINT#449,"HERE IS ";W$(A);".":EXEC32226:SOUND9
00,5
450 NEXTA
460 GOSUB3720
470 IF X=29 AND MU=1 THEN PRINT#449,"A MAD MUMMY BLOCKS YOUR PATH!"EXEC32226:FO
RA=TO 5:SOUND90,10:SOUND40,20:NEXTA
480 IF X=53 AND CR=1 THEN CX=1:PRINT#449,"THE CROCODILES START MOVING!"EXEC32
26:FORA=1 TO 5:SOUND10,50:SOUND100,10:NEXTA ELSE CX=0:CX=0
490 IF DX=1 THEN DX=DX-1:IF DX=0 THEN PRINT#449,"THE MEPTILES JUST MADE A REAL"
:EXEC32226:PRINT#449,"OF YOU!":"EXEC32226:GOTO3790
500 IF P=1 THEN PP=PP+1:IF PP>10 THEN PRINT#449,"YOUR SKIN HAS BECOME RED AND!E
XEC32226:PRINT#449,"BLOCHY! YOU MUST HAVE CAUGHT!"EXEC32226:PRINT#449,"SOMETHING
IN THE TOMB!":EXEC32226:GOTO3790
510 IF PP>7 THEN PRINT#449,"YOU FEEL SICK!"EXEC32226:SOUND2000,10
520 IF P=1:P=-2 THEN P=0
530 IF R=63 OR R=65 OR R=67 THEN IF RND(5)=3 THEN PRINT#449,"THE FLOOR JUST COLA
PSED!"EXEC32226:R=31:FORA=1 TO 300 STEP 10:SOUND4,10:NEXTA
540 IF R=41 AND NW="WEST" THEN PRINT#449,"THE DOOR SLAMS SHUT BEHIND YOU!"EXEC32
226:SOUND200,20:SOUND400,10
550 IF R=1 THEN NW=NW+1
560 IF MK=10 THEN NW(21)="A DEAD MONKEY!"NW=0
570 IF NP(21)=-2 AND RND(5)=2 AND MK=10 THEN NP(21)=-1
580 IF X=41 AND R=3 AND Y=3-2 THEN PRINT#449,"YOUR LIGHT REVEALS A!SOUND10,1
0:EXEC32226:PRINT#449,"PASSAGE LEADING SOUTH":SOUND10,10:EXEC32226:D(21,1)=26:GO
SUB3720
590 IF R=16 AND NW="WEST" THEN IF RND(5)=2 THEN PRINT#449,"YOU SEEM TO HAVE BROW
NED!":EXEC32226:FORA=1 TO 20:SOUND4,6:NEXTA:GOTO3790:IF R=16 AND NW="WEST" TH
EN PRINT#449,"LOOK! YOU SIZM'T BROWN":SOUND40,20:SOUND320,40:EXEC32226
610 GOSUB3720
620 CW=1:"(D<0)W=W"
630 PRINT#449,"==>";
640 SOUND500,10:SOUND400,10:SOUND300,10
650 X=-1
660 PRINT0:POKE135,0
670 PRINT#0:INPUT#0:IA$:FORA=1 TO 70:A=A+INKEY$:IF A=" " THEN NEXTA:PRINTCHR$(5)"
":FORA=1 TO 70:A=A+INKEY$:IF A=" " THEN NEXTA:GOTO670680 A=ASC(A$)
690 PRINTCHR$(5)
700 IF A<95 THEN W=W"GO NORTH":C=0:PRINT#452,W$:STRIND$(18,32):PRINT#460,"";SO
UND50,10:GOTO660
710 IF A<97 THEN W=W"GO SOUTH":C=0:PRINT#452,W$:STRIND$(18,32):PRINT#460,"";SO
UND50,10:GOTO660
720 IF A<21 THEN W=W"GO WEST":C=7:PRINT#452,W$:STRIND$(19,32):PRINT#459,"";SOU
ND50,10:GOTO660
730 IF A<93 THEN W=W"GO EAST":C=7:PRINT#452,W$:STRIND$(19,32):PRINT#459,"";SOU
ND50,10:GOTO660
740 IF A<33 AND C<1 THEN 660
750 IF A<8 THEN PRINTCHR$(8);:W$=LEFT$(W$,LEN(W$)-1):C=C-1:GOTO660
760 IF A<13 THEN 820
770 IF A<32 THEN 660
780 C=C+1:IF C>26 THEN C=26:GOTO660
790 W$=W$+CHR$(A)
800 PRINTCHR$(A);
810 SOUND10,10
820 GOTO660
830 FORA=10 TO 20:SOUNDA,20:NEXTA:GOSUB3560
840 EXEC32226
850 IF W$="" OR LEN(W$)<3 THEN 820
860 SOUND400,10:W$=""
870 IF LEN(W$)<3 THEN 820 ELSE A=ASC(MIDN(W$,1,1)):IF A(65 OR A)90 THEN W$=RIGHT
$(W$,LEN(W$)-1):GOTO870
880 A=INSTR(1,W$," ")
890 IF A=0 THEN W$=W$+W$:"=":GOTO920
900 W$=LEFT$(W$,A-1)
910 W$=RIGHT$(W$,LEN(W$)-A)
920 FORB=1 TO 31
930 IF LEFT$(W$,3)=LEFT$(W$(B),3) THEN 940
940 NEXTB
950 PRINT#449,"I DON'T UNDERSTAND!":EXEC32226:FORA=100 TO 50 STEP-1:SOUNDA,1:NEX
TA:GOTO820
960 ON B GOTO 970,1030,1050,1170,1220,1290,1290,1380,1380,1400,1510,1550,1600,16
60,1710,1710,1830,1910,420,1990,2070,2000,2540,2540,2540,2590,2640,2690,1170,274
0,2790
970 IF NW="NORTH" AND D(R,0)<0 THEN R=D(R,0):GOTO 420
980 IF NW="SOUTH" AND D(R,1)<0 THEN R=D(R,1):GOTO420
990 IF NW="WEST" AND D(R,2)<0 THEN R=D(R,2):GOTO420
1000 IF NW="EAST" AND D(R,3)<0 THEN R=D(R,3):GOTO420
1010 PRINT#449,"YOU CAN'T GO THAT WAY!":SOUND15,300
1020 EXEC32226:GOTO420
1030 IF NW="IT" THEN 1130
1040 IF NW=" THEN PRINT#449,"GET WHAT?":EXEC32226:SOUND40,60:GOTO470
1050 FORA=0 TO 22
1060 O=INSTR(1,NW(A),NW)
1070 IF O=0 THEN NEXTA:PRINT#449,"YOU CAN'T!":EXEC32226:SOUND20,20:SOUND30,20:SO
UND10,20:GOTO470
1080 IF NP(A)<R THEN PRINT#449,"IT'S NOT HERE!"!SOUND50,10:SOUND70,10:SOUND20,1
0:SOUND90,10:EXEC32226:GOTO470
1090 I=I+1:IF I>5 THEN I=5:PRINT#449,"IT'S TOO HEAVY!":SOUND500,10:SOUND25,20:SO
UND700,10:EXEC32226:GOTO470
1100 NP(A)=-2
1110 IF A=21 THEN M=1
1120 PRINT#449,"GOT IT!"EXEC32226:FORA=300 TO 1 STEP-20:SOUNDA,5:NEXTA:GOTO470
1130 FORA=1 TO 22
1140 IF NP(A)=R THEN 1090
1150 NEXTA
1160 PRINT#449,"GET WHAT?":SOUND100,50:EXEC32226:GOTO470
1170 IF NW=" OR NW="IT" THEN PRINT#449,"DROP WHAT?":EXEC32226:SOUND40,60:GOTO47
0
1180 FORA=1 TO 22
1190 O=INSTR(1,NW(A),NW)
1200 IF O=0 THEN NEXTA:PRINT#449,"YOU CAN'T!":EXEC32226:SOUND20,20:SOUND20,30:SO
UND10,20:GOTO470
1210 IF NP(A)<1>2 THEN PRINT#449,"YOU HAVEN'T GOT THAT!":EXEC32226:SOUND70,10:SO
UND50,10:SOUND20,10:SOUND70,10:GOTO470
1220 I=I-1:NP(A)=R:PRINT#449,"DROPPED IT!":EXEC32226:FORA=30 TO 40:SOUNDA,15:NEX
TA:GOTO470
1230 IF NW=" THEN PRINT#449,"WHICH WAY?":SOUND90,70:EXEC32226:GOTO470
1240 IF R=10 OR R=16 OR R=21 THEN IF RND(5)<2 THEN PRINT#449,"THE SEA WASHED YO
U UP AGAIN!":EXEC32226:SOUND150,10:GOTO470
1250 IF R=10 OR R=16 OR R=21 THEN PRINT#449,"YOU SEEMED TO HAVE DROWNED!"EXEC32
226:FORA=30 TO SOUNDA,1:NEXTA:GOTO3770
1260 IF R=25 THEN 970
1270 IF R=58 THEN PRINT#449,"YUCK! IT'S ALL STICKY!"EXEC32226:SOUND640,40:PRINT#
449,"SOMETHING TOUCHED YOUR FOOT!":SOUND640,10:EXEC32226:NP(14)=58:P=1:GOTO470
1280 PRINT#449,"WHERE?"!EXEC32226:SOUND10,70:GOTO470
1290 IF NW="" THEN PRINT#449,"FULL WHAT?":EXEC32226:SOUND600,5:GOTO470
1300 IF R=40 THEN GOTO 1330
1310 IF R=51 THEN GOTO 1350
1320 PRINT#449,"YOU CAN'T!":EXEC32226:SOUND50,50:GOTO470
1330 IF LEFT$(NW,3)="PAN" THEN PRINT#449,"A PANNEL CREAKS OPEN!"!SOUND40,80:SOUN
D50,80:SOUND60,80:EXEC32226:D(40,2)=39:GOSUB3720:GOTO470
1340 GOTO1320
1350 IF LEFT$(NW,3)="LEF" OR LEFT$(NW,3)="RIG" THEN GOTO 1360 ELSE PRINT#449,"WH
ICH ONE"!SOUND10,90:EXEC32226:GOTO470
1360 IF LEFT$(NW,3)="LEF" THEN PRINT#449,"A PIT IN THE FLOOR OPENS!"!EXEC32226:S
OUND90,90:PRINT#449,"YOU FALL THROUGH INTO....":FORA=90 TO 150:SOUNDA,5:NEXTA:EX
EC32226:PRINT#449,"A PIT OF SNAKES!"!SOUND90,90:EXEC32226:GOTO3780
1370 PRINT#449,"THE GATE SLIDES SLOWLY UP!":FORA=500 TO 400 STEP-10:SOUNDA,10:NE
XTA:EXEC32226:D(51,1)=40:GOSUB3720:GOTO470
1380 IF NW=" THEN PRINT#449,"BREAK WHAT?":EXEC32226:SOUND40,80:GOTO470
1390 PRINT#449,"YOU CAN'T!"!SOUND40,60:SOUND300,5:EXEC32226:GOTO470
1400 IF NW=" THEN PRINT#449,"EH?":SOUND40,50:EXEC32226:GOTO470
1410 IF LEFT$(NW,3)="DRU" THEN PRINT#449,"YOU CAN'T!"!SOUND40,90:EXEC32226:GOTO
470
1420 IF NP(21)<-2 THEN PRINT#449,"YOU HAVEN'T GOT IT!":SOUND50,80:EXEC32226:GOTO
470
1430 IF NP(11)<-2 THEN PRINT#449,"WITH WHAT?":EXEC32226:SOUND50,75:GOTO470
1440 PRINT#449,"TO SOUNDS50,15:FORA=1 TO 100:NEXTA
1450 NEXTA
1460 IF R<14 THENPRINT#449,"HEAT BEAT!":EXEC32226:GOTO470
1470 PRINT#449,"THE BOULDER TREMBLES.....":SOUND3000,10
1480 EXEC32226:PRINT#449,"AND ROLLS AWAY REVEALING A":EXEC32226:PRINT#449,"SMALL
CAVE."EXEC32226
1490 D(14,1)=15:GOSUB3720
1500 GOTO470
1510 IF NW=" THEN PRINT#449,"SHAKE WHAT?":EXEC32226:SOUND50,80:GOTO470
1520 IF LEFT$(NW,3)="TRE" AND R=13 AND TW0 THEN PRINT#449,"BOOM!":EXEC32226:FORA
=1 TO 30:SOUNDA,1:NEXTA:SOUND50,50:NP(34)=R:NP(14)=R:P=1:GOTO470
1530 IF LEFT$(NW,3)="SKE" AND R=1 THEN PRINT#449,"RATTLE! RATTLE!":EXEC32226:SO
UND10,5:SOUND20,5:SOUND25,100:NP(15)=R:GOTO
1550 IF NW=" THEN PRINT#449,"LOAD WHAT?":EXEC32226:SOUND70,70:SOUND20,90:GOTO47
0
1560 IF LEFT$(NW,3)="SUN" AND NP(12)=-2 AND NP(13)=-2 THEN PRINT#449,"THE GUN IS
READY TO FIRE."!SOUND50,10:SOUND40,20:SOUND30,30:EXEC32226:D=1:NP(13)=-1:I=I-1:
GOTO470
1570 IF LEFT$(NW,3)="GUN" AND NP(12)(-2 THEN PRINT#449,"YOU HAVEN'T GOT A GUN!"
:EXEC32226:SOUND50,10:GOTO470
1580 IF LEFT$(NW,3)="SUN" AND NP(12)(-2 THEN PRINT#449,"WHAT WITH?":SOUND50,10:
EXEC32226:GOTO470
1590 PRINT#449,"YOU CAN'T LOAD THAT!"!SOUND20,10:EXEC32226:GOTO470
1600 IF NW="BAND" THEN PRINT#449,"SHOOT WHAT?":EXEC32226:SOUND40,10:SOUND30,40:GOT04
70
1610 IF LEFT$(NW,3)="MUM" AND O=1 AND NP(12)=-2 AND R=29 THEN FORA=1 TO 4:PRINT#
449,"BANG!":SOUND200,50:EXEC32226:NEXTA:PRINT#449,"THE MUMMY FALLS DEAD!":EXEC32
226:SOUND40,80:PRINT#449,"A DARK PASSAGE IS REVEALED!":EXEC32226:A=-1
1620 IF O=1 THEN PRINT#449,"YOU CAN'T!"!SOUND40,60:D(29,1)=48:GOSUB3720:GOTO470
1630 IF NP(12)(-2 THEN PRINT#449,"WHAT WITH?":EXEC32226:SOUND90,10:SOUND10,90:G
OTO470
1640 IF O<1 THEN PRINT#449,"THE GUN ISN'T LOADED!"!SOUND40,40:EXEC32226:GOTO470
1650 PRINT#449,"BANG!":SOUND200,50:EXEC32226:PRINT#449,"YOU SHOT INTO THE AIR!"!
EXEC32226:D=0:SOUND10,10:GOTO470
1660 IF NW=" THEN PRINT#449,"LIGHT WHAT?":EXEC32226:SOUND90,90:GOTO470
1670 IF LEFT$(NW,3)="LAM" THEN PRINT#449,"YOU CAN'T LIGHT THAT!"!SOUND30,30:SOU
ND40,40:EXEC32226:GOTO470
1680 IF NP(5)(-2 THEN PRINT#449,"YOU HAVEN'T GOT THAT!"!SOUND10,90:EXEC32226:GO
TO470
1690 IF NP(4)(-2 THEN PRINT#449,"WHAT WITH?"!EXEC32226:SOUND210,20:GOTO470
1700 PRINT#449,"THE LANTERN SHINES BRIGHTLY."!EXEC32226:FORA=40 TO 200 STEP 10:S
OUNDA,5:NEXTA:L=1:GOTO470
1710 IF NW=" THEN PRINT#449,"OPEN WHAT?"!EXEC32226:SOUND200,10:SOUND10,200:GOTO
470
1720 IF LEFT$(NW,3)="DOO" AND R=30THEN PRINT#449,"THE DOOR SQUEEKS HORIBLY OPEN!
"!EXEC32226:SOUND20,20:SOUND30,30:SOUND40,40:D(30,1)=32:GOSUB3720:GOTO470
1730 IF LEFT$(NW,3)="CHE" AND R=36 AND NP(7)=-2 THEN PRINT#449,"THE CHEST OPENS
RELUCTANTLY."EXEC32226:SOUND40,90:NP(12)=R:GOTO470
1740 IF LEFT$(NW,3)="DOO" AND R=45 AND NP(16)=-2 AND NP(16)=-2 AND NP(17)=-2 THE
N PRINT#449,"THE GREAT DOOR OPENS SLOWLY!"EXEC32226:SOUND3000,5:D(45,2)=44:GOSU
B3720:GOTO470
1750 IF (R=41 OR R=50) AND LEFT$(NW,3)="SOO" THEN PRINT#449,"IT WON'T SUDDE!"!EX
EC32226:SOUND90,80:GOTO470
1760 IF LEFT$(NW,3)="GAT" OR LEFT$(NW,3)="POR"; AND R=51 THEN PRINT#449,"IT'S T
OO HEAVY TO OPEN"!EXEC32226:SOUND40,80:SOUND80,40:GOTO470
1770 IF R=38 AND LEFT$(NW,3)="SAR" THEN PRINT#449,"WHICH ONE?"!EXEC32226:SOUND40
,10:GOTO470
1780 IF R=38 AND LEFT$(NW,3)="ONE" OR LEFT$(NW,3)="TWO" OR LEFT$(NW,3)="FOU" OR
LEFT$(NW,3)="THR" THEN PRINT#449,"THERE'S NOTHING!"!SOUND150,10:SOUND250,5
0!SOUND40,50!SOUND90,50!GOTO470
1800 IF R=45 THEN PRINT#449,"IT'S LOCKED!"!SOUND30,100:EXEC32226:GOTO470
1810 IF LEFT$(NW,3)="DOO" THEN PRINT#449,"WHAT DOOR?"!EXEC32226:SOUND500,10!GOTO
470
1820 PRINT#449,"YOU CAN'T DO THAT!"!SOUND150,50:EXEC32226:GOTO470
1830 IF NW=" THEN PRINT#449,"READ WHAT?"!EXEC32226:SOUND100,10!SOUND150,10!GOTO
470
1840 IF R=12 AND LEFT$(NW,3)="SIG" THEN PRINT#449,"IT SAYS : BEWARE THE CURSE OF
":EXEC32226:SOUND40,40!PRINT#449,"ABU SIMBEL."!EXEC32226:SOUND40,40!SOUND40,80:G
OTO470
1850 IF LEFT$(NW,3)="SCR" AND NP(8)=-2 THEN PRINT#449,"IT SAYS : ABU WAS HERE OK
!":EXEC32226:SOUND60,60:GOTO470
1860 IF R=29 OR R=14 THEN 1880
1870 PRINT#449,"YOU CAN'T!"!SOUND20,20:EXEC32226:GOTO470
1880 IF R=14 AND LEFT$(NW,3)="BOU" OR LEFT$(NW,3)="HIE"; THEN PRINT#449,"YOU CA
N'T READ HIEROGLYPHICS!"!EXEC32226:SOUND30,90:GOTO470
1890 IF LEFT$(NW,3)="WAL" OR LEFT$(NW,3)="WRI" THEN PRINT#449,"IT SAYS : 'GOLD-
SILVER-COPPER'"!EXEC32226:SOUND10,10:GOTO470
1900 GOTO1870
1910 IF NW=" THEN 420
1920 IF LEFT$(NW,3)="SCR" OR LEFT$(NW,3)="WALL" OR LEFT$(NW,3)="BOU" THEN 1830
1930 IF R=48 AND LEFT$(NW,3)="PED" THEN PRINT#449,"THERE'S A SMALL HOLE!"!EXEC32
226:SOUND10,90:GOTO470
1940 PRINT#449,"YOU SEE NOTHING SPECIAL!"!EXEC32226:SOUND10,50!SOUND40,60!SOUND8
0,70!GOTO470
1950 IF RND(2)<2 THEN PRINT#449,"NOT NOW!"!EXEC32226:SOUND30,30:GOTO470
1960 IF R<8 OR (R>5 AND R<10) THEN PRINT#449,"LOST? KEEP TYING!"!EXEC32226:SOUND
40,30!GOTO470
1970 IF R=13 THEN PRINT#449,"TRY THE FRUIT!"!EXEC32226:SOUND50,70!GOTO470
1980 IF R=14 THEN PRINT#449,"WHAT ABOUT THE BOULDER?"!EXEC32226:SOUND10,20!GOTO4
70
1990 IF R=21 THEN PRINT#449,"SOME LIGHT MIGHT HELP."!EXEC32226:SOUND10,30!GOTO47
0
2000 IF R=29 THEN PRINT#449,"KILL THE MUMMY."!SOUND10,20:EXEC32226:GOTO470
2010 IF R=36 OR R=45 THEN PRINT#449,"WON'T OPEN! UNLOCK IT!"!EXEC32226:SOUND10,1
0!GOTO470
2020 IF R=37 AND R(42 THEN PRINT#449,"EXITS ARE NOT ALWAYS OBVIOUS."!EXEC32226!S
OUND10,30:GOTO470
2030 IF R=53 THEN PRINT#449,"DO SOMETHING, QUICKLY!"!EXEC32226:SOUND10,20!GOTO47
0
2040 IF R=50 THEN PRINT#449,"SOMETHING ELSE MAY HELP."!EXEC32226:SOUND10,10!GOTO
470
2050 IF R=48 THEN PRINT#449,"TRY THE PESISTAL."!EXEC32226:SOUND10,20!GOTO470
2060 PRINT#449,"I CAN'T HELP YOU HERE!"!EXEC32226:SOUND40,90!GOTO470
2070 PRINT#449,"DO YOU WISH TO SAVE YOUR"!SOUND10,10:EXEC32226:PRINT#449,"CURREN
T POSITION !"!SOUND10,10
2080 POKE65494,0
2090 AW=INKEY$:IF AW=" THEN 2090
2100 IF AW="Y" THEN A=0:SOUND50,50:PRINT#467,AW:GOTO2130
2110 IF AW="N" THEN A=-1:SOUND50,50:PRINT#467,AW:GOTO2130
2120 GOTO2090
```

(continued on next page)

(continued from previous page)

```
2130 A#=INKEY$:IF A#="" THEN 2130
2140 IFA#=CHR$(13) THEN SOUND20,90:GOTO2170
2150 IF A#=CHR$(8) THEN SOUND40,10:PRINT#467,"?":GOTO2090
2160 GOTO2130
2170 EXEC32224
2180 IF A#-1 THEN GOTO 2320
2190 PRINT#449,"PLEASE POSITION THE TAPE.":EXEC32224:SOUND10,10:PRINT#449,"PRESS
 A KEY !":ISOUND10,10:MOTOR ON:AUDIO ON
2200 A#=INKEY$:IF A#="" THEN 2200
2210 PRINT#41:EXEC32224:MOTOR OFF:AUDIO OFF
2220 PRINT#449,"PRESS RECORD.":SOUND40,80:EXEC32224:PRINT#449,"PRESS A KEY !":IS
OUND10,10
2230 A#=INKEY$:IF A#="" THEN 2230
2240 PRINT#41:EXEC32224
2250 PRINT#449,"SAVING....":SOUND40,90:EXEC32226
2260 OPEN"O",#-1,"DATA"
2270 PRINT#-1,R,I,MU,CR,CC,F,FF,T,M,MM,L,O
2280 FORA=1 TO25:PRINT#-1,MF:A:INEXTA
2290 CLOSE#-1
2300 PRINT#449,"DONE":SOUND30,50:EXEC32224
2310 GOTO2020
2320 A=0:PRINT#449,"DO YOU WISH TO LOAD A GAME ?":ISOUND10,10
2330 A#=INKEY$:IF A#="" THEN 2330
2340 IF A#-"Y" THEN PRINTCHR$(8):A=A-1:GOTO2370
2350 IF A#="Y" THEN PRINTCHR$(8):A#=GOTO2370
2360 GOTO2330
2370 SOUND30,80
2380 A#=INKEY$:IF A#="" THEN 2380
2390 IF A#=CHR$(8) THEN GOTO2420
2400 IF A#=CHR$(13) THEN 2420
2410 GOTO2380
2420 SOUND40,20:EXEC32224
2430 IF A-1 THEN PRINT#449,"VERY WELL.":EXEC32224:FORA=20 TO 40:SOUNDA,50:NEXTA
:GOTO2370
2440 PRINT#449,"SEARCHING....":EXEC32224:SOUND10,10
2450 OPEN"I",#-1,"DATA"
2460 PRINT#449,"LOADING....":EXEC32224:SOUND10,10
2470 INPUT#-1,R,I,MU,CR,CC,F,FF,T,M,MM,L,O
2480 FORA=1 TO 25:INPUT#-1,MF:A:NEXTA:CLOSE#-1
2490 CLOSE#-1:PRINT#449,"DONE":EXEC32224:SOUND20,20:GOTO420
2500 IF M#="" THEN PRINT#449,"IT WHAT?":EXEC32224:SOUND40,90:GOTO470
2510 IF M#="HE" THEN PRINT#449,"YOU CAN'T":EXEC32224:SOUND90,40:GOTO470
2520 IF MP(18)-2 THEN PRINT#449,"YOU CAN'T!":EXEC32224:SOUND40,90:GOTO470
2530 PRINT#449,"IT FITS INTO THE HOLE!":EXEC32224:SOUND10,10:SOUND20,20:SOUND30,
30:PRINT#449,"WITH A CRASH THE CRYSTAL":EXEC32224:SOUND20,20:PRINT#449,"SHATTERS
":EXEC32224:FORA=30 TO 1 STEP-1:SOUNDA,A:NEXTA:MP(17)=8:GOTO470
2540 IF M#="" THEN PRINT#449,"HUH":EXEC32224:SOUND100,40:GOTO470
2550 IF LEFT#(W,3)="HIT" AND LEFT#(W,3)="DRU" THEN 1420
2560 IF M#="DO" AND LEFT#(W,3)="WHO" THEN PRINT#449,"IT DOESN'T LIKE THAT!":EXEC32
224:SOUND20,70:SOUND70,70:GOTO470
2570 IF P=29 AND(LEFT#(W,3)="RUN" THEN PRINT#449,"IT DOSEN'T LIKE THAT!"ISOUND50
,50:SOUND20,50:EXEC32224:GOTO470
2580 PRINT#449,"YOU CAN'T!":SOUND40,80:EXEC32224:GOTO470
2590 IF M#="" THEN PRINT#449,"DIG WHAT?":SOUND40,80:EXEC32224:GOTO470
2600 IF LEFT#(W,3)="HOL" THEN PRINT#449,"YOU CAN'T!":SOUND90,80:EXEC32224:GOTO
470
2610 IF MP(20)-2 THEN PRINT#449,"WITH WHAT?":EXEC32224:SOUND50,70:GOTO470
2620 IF R=166 THEN PRINT#449,"WHY?":SOUND20,60:EXEC32224:GOTO470
2630 PRINT#449,"THE SAND POURS FROM YOUR":SOUND10,10:EXEC32224:PRINT#449,"HOLE
AND COVERED YOU!":SOUND40,90:GOTO2770
2640 IF M#="" THEN PRINT#449,"OIL WHAT?":EXEC32224:SOUND60,85:GOTO470
2650 IF MP(22)-2 THEN PRINT#449,"WITH WHAT?":SOUND20,60:EXEC32224:GOTO470
2660 IF R=90 THEN PRINT#449,"WHAT GOOD DID THAT DO?":SOUND50,90:EXEC32224:MP(2
2)=-1:GOTO470
2670 IF LEFT#(W,3)="DOO" THEN PRINT#449,"WHAT GOOD DID THAT DO?":SOUND40,70:E
XEC32224:MP(22)=-1:GOTO470
2680 PRINT#449,"THE DOOR CRASHES OPEN":SOUND4000,5:EXEC32224:SOU,2:49:SOUS372
01MP(22)=-1:GOTO470
2690 IF M#="" THEN PRINT#449,"FEED WHAT?":EXEC32224:SOUND30,20:GOTO470
2700 IF LEFT#(W,3)="MON" AND MP(21)=-2 AND MP(3)=-2 AND MM:10THEN PRINT#449,"TH
E MONKEY RECEIVES BUICHL":EXEC32224:SOUND10,10:PRINT#449,"AND RUNS OFF!":SOUND4
0,20:EXEC32224:SOUND10,10:MP(3)=-1:MP(21)=-1:GOTO470
2710 IF LEFT#(W,3)="CRO" AND MP(21)=-2 AND MM:10 AND R=53 THEN PRINT#449,"THE C
ROCODILES DEVOUR THE":EXEC32224:SOUND10,10:PRINT#449,"MONKEY THEN SLINK OFF INT
O":EXEC32224:SOUND10,10:PRINT#449,"THE DARKNESS."EXEC32224:SOUND10,10:CR=-1:R53
,115T:A=-1
2720 IF A=-1 THEN SOUS372:MP(21)=-1:GOTO470
2730 PRINT#449,"YOU CAN'T!":SOUND90,90:EXEC32224:GOTO470
2740 IF M#="" THEN PRINT#449,"EAT WHAT?":EXEC32224:SOUND10,70:GOTO470
2750 IF LEFT#(W,3)="ABO" THEN PRINT#449,"THE SKY DARKENS AND THE GROUND":EXEC32
224:SOUND10,10:PRINT#449,"TREMBLES FOR A SECOND!":EXEC32224:SOUND5000,10:GOTO470
2760 PRINT#449,"OK.":EXEC32224:SOUND50,70:GOTO470
2770 STOP
2780 PRINT#449,"YOU'VE GOT !"
2790 END
2800 FORA-1 TO 25
2810 IF MP(A)=-2 THEN XX=A:PRINT#41,MM(A):EXEC32226:SOUND80,80
2820 NEXTA
2830 IF XH0 THEN PRINT#41,"NOTHING":SOUND40,10:SOUND40,20:SOUND40,30:EXEC32226
2840 GOTO470
2850 ZBAIN AN ENDLESS SANDY DESERT. THE SUN IS SHINNING VERY BRIGHTLY AND YOU S
EE AN OASIS IN THE DISTANCE.
2860 ZBAIN AN OASIS WITH PALM TREES GROWING AROUND A POOL OF CLEAR WATER.
2870 ZBAIN THE SEA SHORE. A PERBLY BEACH RUNS DOWN INTO THE BLUE SEA. A PATH LE
ADS EAST AWAY FROM THE SEA.
2880 ZBAIT THE EDGE OF A VAST SANDY DESERT. NEARBY IS A CROSS ROADS OF DIRT PAT
HS WITH ONE OF THEM LEADING STRAIGHT INTO THE SANDY WASTE.
2890 ZBAIN A SMALL MUD HUT WITH A THATCHED ROOF. THERE IS A DOOR IN THE WEST WA
LL AND A SIGN IS STUCK IN THE GROUND.
2900 ZBAIN A SMALL WALLED COURTYARD WITH A LARGE FIG TREE GROWING IN THE MIDDLE
. THE TREE IS LOADED WITH LUSCIOUS FRUIT.
2910 ZBAIT THE NORTH END OF A RIVER VALLEY. A HUGE BOULDER COVERED WITH HIEROGL
YPHICS CONFRONTS YOU.
2920 ZBAIN A SMALL DIRT CAVE WITH TREE ROOTS HANGING DOWN FROM THE ROOF. SMALL
ROCKS ARE SCATTERED AROUND ON THE FLOOR.
2930 ZBAIN A PERBLY BEACH WITH HIGH CLIFFS RISING UP BEHIND. THE SHORE STRETCHE
S NORTH-SOUTH.
2940 ZBAIN A NARROW DIRT PATH RUNNING ALONG THE TOP OF SOME HIGH CLIFFS. THE PA
TH RUNS NORTH-SOUTH AND A JUNCTION LEADS EAST INTO THE DENSE BUSH.
2950 ZBAIN WALKING ALONG A NARROW TRAIL IN THE DENSE BUSH LAND. THE TRAIL TWISTS EAS
T AND WEST AND THERE IS A CLEARING TO THE SOUTH.
2960 ZBAIWALKING ALONG A DRY BED OF RIVER BED. THE SIDES AND BOTTOM ARE CRACKED AN
D PARCHED. A CARVED STONE STAIRWAY LEADS AWAY NORTH AND THE RIVER BED STRETCHES
EAST-WEST.
2970 ZBAIN THE END OF A DUSTY RIVER VALLEY WITH HIGH CLIFF SIDES. IT WINDS NORTH-SOUTH AND
 A PATH LEADS WEST.
2980 ZBAIN A BEACH IN FRONT OF A LARGE DARK OPENING IN THE SOUTH CLIFF WALL.
2990 ZBAIT THE END OF THE CLIFF PATH. THICK BUSH SURROUNDS YOU TO THE EAST & SO
UTH. THE CLIFF FALLS SHARPLY DOWN TO THE WEST.
3000 ZBATAIN A SMALL CLEARING WITH THICK BUSH ALL AROUND. A LARGE DEAD TREE IS L
YING TO THE SOUTH AND A TRAIL LEADS NORTH.
3010 ZBATAAT A HUGE HIEDOUS FACE CARVED INTO A CLIFF WALL. A TUNNEL LEADS THROUGH
ITS SHARP TOOTHED MOUTH INTO DARKNESS.
3020 ZBATAAT THE SOUTH END OF A RIVER VALLEY. THE HIGH CLIFF FACES TOWER ABOVE YO
U AND THE ONLY WAY IS NORTH.
3030 ZBATAIN A SMALL TWISTING TUNNEL. THE WALLS ARE CARVED OUT OF ROCK AND THE AI
R IS STALE AND DANK. PASSAGES LEAD NORTH SOUTH & EAST.
3040 ZBATAIN A NARROW TUNNEL LEADING EAST-WEST. A SMALL OPENING LEADS SOUTH AND T
HE WALLS ARE DAMP.
3050 ZBATAAT A TURNING IN THE TUNNEL. THE ROOF IS DRIPPING WITH WATER AND AN EERI
E NOISE WHISTLES THROUGH THE CAVE.
3060 ZBATAINSIDE THE DOORWAY TO A TOMB. MASSIVE SUPPORTS HOLD THE BULGING ROOF UP
 AND THE FLOOR IS COVERED WITH A THICK LAYER OF DUST.
3070 ZBATAIN A ROUND DOME SHAPED CAVERN. THERE ARE SMALL HOLES IN THE CENTRE OF T
HE ROOF AND FLOOR. A LARGE WOODEN DOOR IS SET IN THE SOUTH WALL.
3080 ZBATAIN A HIGH ROOFED CAVERN WITH ROCKS AND DEBRIS LITTERING THE FLOOR. THE
CAVE WINDS NORTH-SOUTH.
3090 ZBATAIN WHAT LOOKS LIKE A STONE ROOM CARVED OUT OF THE ROCK. BOXES AND BARRE
LS ARE STACKED HIGH ALL AROUND THE WALLS.
3100 ZBATAIN A GIANT HIGH VAULTED CAVERN. STALAGTITES HANG OMINOUSLY FROM THE CEI
LING AND MUFFLED BOOMING NOISES COME FROM THE BLACKNESS BEYOND YOUR LIGHT.
3110 ZBATAIN A SMALL CARVED CAVE. A HUGE IDOL HAS BEEN SCULPTURED FROM A GIANT ST
ALAGMITE IN THE CENTRE OF THE ROOM.
3120 ZBATAHURRUNDED BY WALLS IN A VAULTED CAVE WITH A PASSAGE HIGH UP IN THE EAS
T WALL. A WATERY PASSAGE RUNS WEST OUT INTO DAYLIGHT.
3130 ZBATAIN A SQUARE CUT CAVERN WITH OLD ROTTING TWIGS LYING SCATTERED ON THE FL
OOR. A IRON BOUND CHEST SITS IN THE CORNER.
3140 ZBATAIN A SMALL CAVE WITH LARGE CRACKS RUNNING FROM FLOOR TO CEILING. LARG
E BOULDERS AND ROCKS LITTER THE FLOOR.
3150 ZBATAIN A STONE WALLED ROOM WITH A ROW OF BRIGHTLY PAINTED SARCOPHAGI STANS
INO ALONG THE NORTH WALL. THE DOOR WAY LEADS SOUTH.
3160 ZBATAIN A SMALL STONE ROOM WITH A LIONS HEAD. A GREAT GOLD THRONE STANDS IN
 THE CENTRE AND WIERD WRITING IS MARKED HERE AND THERE.
3170 ZBATAIN A LARGE WOODEN PANNELED ROOM WITH COLOURFUL TILES SET IN THE FLOOR A
ND CEILING.
3180 ZBATAIN A CRUMBLING STONE LINED CHAMBER. ROSTY CHAINE HOLD AN OLD WHITE BONE
D SKELETON TO THE WALL. AND A HUGE IRON DOOR BARS THE WAY EAST.
3190 ZBATAIN A SMALL SQUARE ROOM WITH A MANHOLE IN THE CEILING. A LARGE IRON STU
DED DOOR IS IN THE WEST WALL.
3200 ZBATAIN A CHAMBER WITH PAINTINGS OF EGYPTIAN LIFE ON THE WALLS FLOOR AND CEI
LING. A DOOR WAY FACES WEST.
3210 ZBATAIN BUT THERE IS NOTHING THE TREASURE ROOM! THE GOLDEN MASK LIES BEFORE YOU ON A
 SHINING MAT. YOU GRASP IT IN YOUR HANDS AND A SUDDEN LOW BOOMING AND RUMBLING HO
IBE SHUDDERS THE WHOLE ROOM. BEWARE THE CURSE OF ABU SIMBEL.
3220 ZBATAIN A LARGE CHAMBER WITH FOUR DOOR WAYS IN IT. THE WEST DOOR IS A MASSIV
E AFFAIR WITH A HUGE THREE KEY LOCK IN IT.
3230 ZBATAIN A TALL ROOM WITH A SUNKEN FLOOR. THERE ARE POLLS OF WATER AND TWO HUGE OR
NEN FIERCE LOOKING CROCODILES STARE AT YOU BLOCKING THE WAY ACROSS THE ROOM.
3310 ZBATAIN A LARGE SMOOTH WALLED CHAMBER. THERE ARE BENCHES AROUND THE WALLS AN
D A DOOR LEADS SOUTH.
3320 ZBATAIN A NARROW TWISTING TUNNEL. SET IN THE WALLS ARE SHINING STONES AND PA
SSAGES LEAD EAST WEST & NORTH.
3330 ZBATAIN A NARROW TWISTING TUNNEL. SET IN THE WALLS ARE SHINING STONES AND PA
SSAGES LEAD EAST WEST & NORTH.
3340 ZBATAIN A NARROW TWISTING TUNNEL. SET IN THE WALLS ARE SHINING STONES AND PA
SSAGES LEAD EAST WEST & NORTH.
3350 ZBATAIN A LARGE GRAND ROOM. A SQUARE POOL OF BLUE LIQUID IS SET IN THE MIDDL
E OF THE FLOOR. ARCHED DOORS LEAD OFF NORTH SOUTH & WEST.
3360 ZBATAIN A SMALL CELLAR. THE AIR IS VERY COLD AND OPEN BOXES ARE STREWN ACROS
S THE FLOOR.
3370 ZBATAIN A CHAMBER WITH STONE SLABS LINING THE WALLS. SOME ARE CRACKED AND BR
OKEN AND PASSAGES LEAD IN ALL DIRECTIONS.
3390 ZBATAIN A WOODEN ROOM WITH SHELVES STOCKED HIGH WITH ALL KINDS OF JARS BOTTL
E POTS AND VASES.
3400 ZBATAIN A SMALL SMOOTH WALLED CHAMBER. THERE ARE BENCHES AROUND THE WALLS AN
D A DOOR LEADS NORTH.
3410 ZBATAIN A SQUARE CUT TUNNEL. LARGE CRACKS APPEAR IN THE FLOOR AND IT FEELS EXT
REMELY UNSAFE.
3420 ZBATAAT A SMALL CAVE HEWN OUT OF THE ROCK. STRANGE WRITING COVERS THE WALLS
AND A PASSAGE LEADS EAST.
3430 ZBATAIN A TWISTING ROCK CUT TUNNEL. LARGE CRACKS APPEAR IN THE FLOOR AND IT
FEELS EXTREMELY UNSAFE.
3440 ZBATAIN A CAVE WITH A SANDY FLOOR. THE SOME SHAPED ROOF IS CRACKED AND LOOKS
 NON TOO SAFE.
3450 ZBATAIN THE END OF A TWISTING ROCK CUT TUNNEL. LARGE CRACKS APPEAR IN THE FL
OOR AND IT FEELS EXTREMELY UNSAFE.
3460 ZBATAIN A STONE WALLED ROOM. A WALLED ROOM. STARS AND MOONS ARE PAINTED ON
THE FLOOR AND IN THE CENTRE STANDS A CRYSTAL PEDESTAL.
3470 ZBTA2,4,4,2,3,0,1,3,6,0,2,3,1,7,7,5,2,0,4,6,3,9,0,9,4,11,7,8,5,9,7,9,6,8,8 *
3480 ZBTA16,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,11,2
2,0,18,0,23,17,19,13,24,18,20,14,25,19,0
3490 ZBTA18,0,0,0,17,0,0,18,0,0,0,0,19,0,0,0,0,0,0,0,0,0,0,0,0,31,30,0,27,0,31,26,28,0,3
4,27,0,34,0,0,0,26,0,0,0,0,27,33,0,0
3500 ZBTA30,0,0,0,0,0,31,36,0,34,28,37,33,0,0,0,0,16,0,33,0,35,37,34,0,36,0
3510 ZBTA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,38,0,40,0,0,45,0,0,43,0,0,42,0,0,0,0,0,42,31,
0,46,0,0,45,47,0,53,46,48,29,0,47,0
3520 ZBTA0,0,0,0,0,0,0,0,0,0,0,51,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
```

For home or business the IBM compatible

Advance 86a

16 Bit Micro-Computer

Under £350*

For the home user start with Model A with its massive 144K RAM and outstanding typewriter style keyboard that fits within the base unit for portability and storage.
Note the large return key and position of the numeric keyboard. Fast retrieval from storage and fast action on games is achieved by the use of the Intel 8086 True 16-bit micro-processor running at 4.77 MHz.
The Advance 86 runs IBM PC software.

Specification

CPU Type	True 16-bit 8086 running at 4.77 MHz.
RAM	128K or 256K with parity plus 16K video
Languages Included	Basic
Type of Keyboard	Full 84 keys tactile
Keyboard Facilities	10 programmable keys
Character Set	256 in ROM
Method of Display	TV, RGB, Comp/Sync colour or monochrome monitor
Display Facilities	Full screen handling, 4 screen paged
Text	80 x 25 or 40 x 25
Graphics Resolution	320 x 200 or 640 x 200
Colours Available	16
Graphics Facilities	Scroll, reverse image
Cassette Recorder	Audio
Interfaces Included	Cassette port, light pen, joystick, Centronics
Sound	Built-in speaker
Operating System	Built-in ROM
Printers	Any using Centronics parallel interface
Comments	Hardware and software compatible with IBM PC Upgradeable to Model B Provision for 8087 Arithmetic Processor
Warranty	12 months

The business user can upgrade to Model B by adding the Advance Expansion box containing 2 × 5.25" disc drives providing 720K storage at £956.52 + VAT.
The Advance 86 Model B offers the business micro-computer buyer an IBM compatible disk-based system with twin drives, with Perfect Writer/Speller, Calc and Filer Software (MS/DOS) included for only £1303.48 + VAT.

Advance 86 Models A & B are designed and marketed by Advanced Technology UK Ltd. Made by FERRANTI in Oldham. Delivery within 30 days from receipt of payment. 128K memory expansion £108.70 + VAT.

Advance Technology UK Ltd.
8A Hornsey Street, London N7 8ZHB
Tel: 01-609 0061 for leaflet:

On site warranty for 12 months by National Advanced Systems (part of National Semiconductor) one of the largest companies in the U.S.A. for 86B.
*Ex VAT.

Benchmarks

The standard Benchmarks were run using Advance Basic, which is the equivalent of Microsoft GWBasic and Basica on the IBM PC.

Machine	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Advance 86 — 8086	0.8	3.3	7.3	7.4	8.1	14.6	23.9	26.0	11.4
ACT Apricot — 8086	1.6	5.2	10.6	11.0	12.4	22.9	35.4	34.4	16.7
IBM PC — 8088	1.2	4.8	11.7	12.2	13.4	23.3	37.4	30.0	16.8

To Advance Technology UK Ltd., 8A Hornsey Street, London N7 8HB

☐ Please send Model 86A, Micro-Computer & Keyboard I enclose £399 including VAT
☐ Please send Model 86B which includes Model 86A plus Expansion Box & Software. I enclose £1499 inc. VAT.
☐ Please send 128K Memory Expansion £125 inc. VAT. Cheque/Barclaycard/Access No. _____

Name _____ Company _____
Address _____ Address _____

YC

AMSTRAD WORD PROCESSOR

Roger Hammond gives you a large range of options for printing pages, quitting, scrolling, or cataloguing the tape

Listing 1. The loader program.

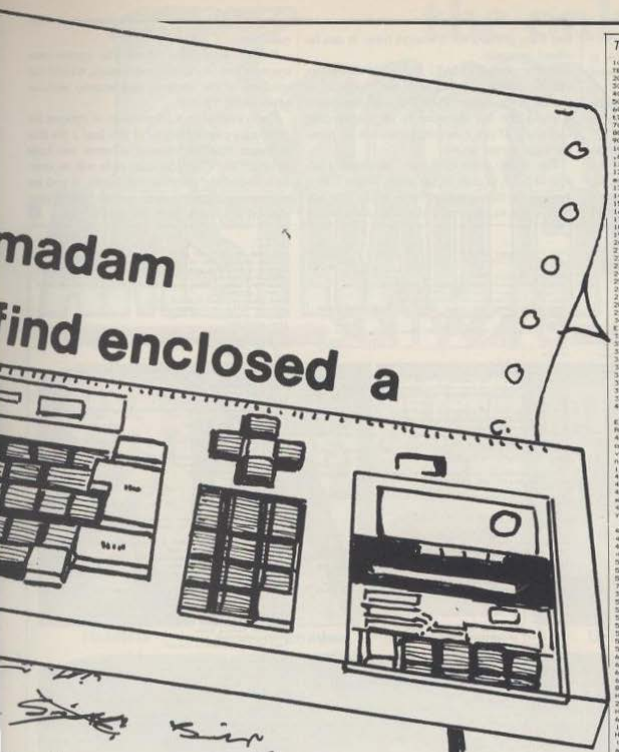
```
10 MEMORY 35999
20 ZONE 6
30 FOR I=36000 TO 36266
40 PRINT I,:INPUT X%
50 POKE I,X%
60 NEXT I
70 FOR X=36000 TO 36260 STEP 10
80 PRINT X,
90 FOR I=0 TO 9
100 PRINT PEEK(X+I),
110 NEXT I
120 PRINT
130 NEXT X
140 INPUT "IS THIS CORRECT? (Y/N)";Q$
150 IF Q$="y" OR Q$="Y" THEN 190
160 IF Q$<>"N" AND Q$<>"n" THEN 140
170 INPUT "enter address and correct
    value seperated by a comma";ad,x%
180 POKE ad,x%:GOTO 70
190 INPUT "ENTER FILENAME";N$
200 SAVE N$,B,36000,267
```

The machine code.

36000	33	32	78	1	127	62	54	32	35	13
36010	32	250	14	0	5	32	245	201	42	189
36020	77	1	64	7	62	32	119	35	13	32
36030	251	14	0	5	32	246	201	42	189	77
36040	1	64	7	126	205	90	187	35	13	32
36050	248	14	0	5	32	243	201	17	96	134
36060	42	191	77	14	20	58	194	77	71	126
36070	18	19	35	16	250	58	193	77	71	35
36080	16	253	13	32	236	17	112	148	33	112
36090	148	14	3	58	194	77	71	126	18	35
36100	19	16	250	58	193	77	71	35	16	253
36110	13	32	236	237	91	196	77	42	196	77
36120	58	195	77	71	43	16	253	237	75	198
36130	77	237	184	235	19	33	112	148	237	75
36140	195	77	6	0	237	176	237	91	191	77
36150	33	96	134	14	20	58	194	77	71	126
36160	18	19	35	16	250	58	193	77	71	19
36170	16	253	13	32	236	201	33	112	148	6
36180	240	54	32	35	16	251	201	17	96	134
36190	42	191	77	14	20	58	194	77	71	126
36200	18	19	35	16	250	58	193	77	71	35
36210	16	253	13	32	236	237	75	198	77	237
36220	91	200	77	42	202	77	237	176	58	204
36230	77	71	54	32	43	16	251	237	91	191
36240	77	33	96	134	14	20	58	194	77	71
36250	126	18	19	35	16	250	58	193	77	71
36260	19	16	253	13	32	236	201	0	0	0

ROBWRITE IS a word-processing program that allows the user to Save and Load files, use different sizes of text if his printer permits, change margins, access nine different pages of 20 lines which can easily be printed consecutively and exercise full editing functions. It has been written for an Epson RX-80 F/T but should run on most printers with little alteration.

The machine code should be entered and saved to tape first as the program will probably crash if it is not present. Listing 1 will load this if you enter the values given in the decimal dump. The machine code should be



The main program.

```
10 REM*********************************************ROBNRI
TE*********************
20 SPEED WRITE 1
30 OPENOUT "dummyfile"
40 MEMORY 19000
50 CLOSEOUT
60 EMPHASIZE=1:STRIKE=1:TYPE=1:SETS=1:SPACES=6:inser
t$=1
70 BOTTOM=20
80 DIM stab$(80):FOR i=1 TO 80:stab$(i)=0:NEXT
90 MODE 2:ZONE 80:INK 0,16:BORDER 10:INK 1,26
100 WINDOW #2,1,80,1,22:WINDOW #1,1,80,22,25:WINDOW #2
,60,70,25,25
110 PRINT#2"write2","by Robin J.R. Hammond.",,,,
120 PRINT"use the following keys to control the progra
m",,
130 ZONE 30
140 PRINT"ARROWS","to move the cursor"
150 PRINT"DEL","to delete text"
160 PRINT"ENTER","for carriage return"
170 PRINT"TAB","to move to the next tab position"
180 PRINT"CTRL and TAB","to set a tab position"
190 PRINT"CLR","to clear all tab stops"
200 PRINT"CTRL and ";CHR$(93),"to enter delete mode"
210 PRINT "CTRL and ";CHR$(91),"to enter insert mode"
220 PRINT"COPY","to display options",,
230 ZONE 80
240 PRINT #1,"PLEASE WAIT"
250 LOAD "",36000
260 CLS #1
270 PRINT ,,,,"PRESS ANY KEY TO CONTINUE,,,"
280 IF INKEY$="" THEN 280
290 WIDTH 80
300 CLS:PRINT CHR$(7);:PRINT "PLACE THE PRINTER ON LIN
E."
310 PRINT #8,CHR$(27);"R";:CLS
320 PRINT #8,CHR$(27);"E";
330 PRINT #8,CHR$(27);"G";
340 PRINT #8,CHR$(27);"A";CHR$(SPACES);
350 PRINT #8,CHR$(27);"P";
360 PRINT #8,CHR$(27);"C";CHR$(10);CHR$(1);
370 PRINT #8,CHR$(27);"N";CHR$(12);
380 PRINT #8,CHR$(13);
390 PRINT"Current printer settings are",,,,
400 PRINT"PICA SIZED PRINT","EMPHASIZED PRINT","DOUBLE
 STRIKE ON","6/72 INCH LIN
E SPACING","11 INCH PAPER LENGTH","1 INCH SKIP OVER PE
RFORATION SETTING"
410 PRINT,,,,"These may be changed at any time during
operation of the program b
y pressing   COPY and selecting the appropriate optio
n.  Changing any setting m
ii however  cause the paper to move up slightly."
420 PRINT,,,"PRESS ANY KEY TO CONTINUE,,,"
430 IF INKEY$="" THEN 430
440 PRINT CHR$(7);:CLS:PRINT #1,"Do you want standard
margins? Press Y or N"
450: g$=INKEY$:IF g$="" THEN 450 ELSE IF g$="y" OR g$=
"Y" THEN GOSUB 3390 ELSE IF
 g$="n"OR g$="N" THEN GOSUB 3390 ELSE 450
460 CLS #1
470 POKE 19901,620:POKE 19902,44E
480 CALL 36000
490 CALL 16176
500 i=0:FOR i=1,9999:next:i
510 CLS:ZONE 25:GOSUB 3410
520 n$="123456789012345678901234567890123456789012345
789012345678901234567890123
456789"
530 LOCATE 1,21:PRINT n$;
540 x1=left1:y1=1
550 page=1
560 PRINT CHR$(7);
570 PRINT #2,"page ";page;
580 k$=INKEY$
590 PRINT CHR$(22);CHR$(1)
600 LOCATE x1,y1:PRINT " ";
610 PRINT CHR$(22);CHR$(0)
620 IF k$="" THEN 580
630 IF k$=CHR$(13) THEN 760 ELSE IF k$=CHR$(127) THEN
800 ELSE IF k$=CHR$(240) T
HEN 870 ELSE IF k$=CHR$(24) THEN 910 ELSE IF k$=CHR$(
242) THEN 950 ELSE IF k$=C
HR$(243) THEN 990 ELSE IF k$=CHR$(224) THEN 1910
640 IF k$=CHR$(9) THEN 1030 ELSE IF k$=CHR$(225) THEN
 1110 ELSE IF k$=CHR$(16) T
HEN 1120 ELSE IF k$=CHR$(27) THEN 1140 ELSE IF k$=CHR
$(29) THEN 1450
650: IF insert$=1 THEN 660 ELSE lng$=lng$+k$:IF lng$.pos
lng$ THEN PRINT CHR$(7);:G
OTO 580
660: IF x1=right$-5 THEN SOUND 1,60,10,2
670 LOCATE x1,y1:PRINT k$;
680 POKE n,ASC(k$)
690: IF y1=bottom$ AND x1=right$ THEN 580
700 n=n+1
710 x1=x1+1
720: IF x1=right$ THEN 580
730 x1=left$:y1=y1+1
740 n=n+left$-right$+79
750 GOTO 580
760 REM ''''' CR
770 IF y1=bottom$ THEN 580 ELSE LOCATE x1,y1:PRINT CHR
$(PEEK(n));
780 n=n+left$-x1+80:x1=left$:y1=y1+1
790 GOTO 580
800 REM ''''' DELETE
810 IF x1=left$ AND y1=1 THEN 580
820 LOCATE x1,y1:PRINT CHR$(PEEK(n));
830 x1=x1-1:n=n-1:IF x1=left$-1 THEN GOSUB 860
840 LOCATE x1,y1:PRINT " ";:POKE n,32
850 GOTO 580
860 x1=right$:y1=y1-1:n=n-79+right$-left$:RETURN
870 REM cursor up
880 IF y1=1 THEN 580 ELSE LOCATE x1,y1:PRINT CHR$(PEEK
(n));
890 y1=y1-1:n=n-80:LOCATE x1,y1:PRINT CHR$(PEEK(n));
900 GOTO 580
910 REM cursor down
920 IF y1=bottom$ THEN 580 ELSE LOCATE x1,y1:PRINT CHR
$(PEEK(n));
930 y1=y1+1:n=n+80:LOCATE x1,y1:PRINT CHR$(PEEK(n));

940 GOTO 580
950: IF x1=left$ AND y1=1 THEN 580 ELSE LOCATE x1,y1:PR
INT CHR$(PEEK(n));
960 IF x1=left$ THEN 980
970 x1=x1-1:n=n-1:LOCATE x1,y1:PRINT CHR$(PEEK(n));:GO
TO 580
980: x1=right$:y1=y1-1:n=n-80+right$-left$:LOCATE x1,y1
:PRINT CHR$(PEEK(n));:GOTO
 580
990 REM cursor right
1000 IF x1=right$ THEN 1020 ELSE LOCATE x1,y1:PRINT CH
R$(PEEK(n));
1010 x1=x1+1:n=n+1:LOCATE x1,y1:PRINT CHR$(PEEK(n));:G
OTO 580
1020 SOUND 1,80,20,2:IF y1=bottom$ THEN 580 ELSE LOCAT
E x1,y1:PRINT CHR$(PEEK(n)
);:x1=left$:y1=y1+1:n=n+left$-right$+80:GOTO 580
1030 IF x1=right$ THEN 760
1040 FOR i1=x1+1 TO right$
1050 IF stab$(i1)=1 THEN 1080
1060 NEXT i1
```

saved to tape using the following command:
SAVE <FILENAME>,B,START ADDRESS,267

Do not try calling the machine code other than from the main program as it uses variables Poked from Basic.

Once the machine code is in memory and has been saved, enter the Basic program. The program will normally load the code itself when it is run but, during development, if you are sure that the code is present above Himem it may be a good idea to turn line 290 into a Rem statement or to remove the exclamation mark from within the quotes so that the computer will warn you that it is about to attempt to load.

When you have debugged the program save it with the machine code after it, making certain that line 290 is back to its original form.

There are about two kilobytes left free in Basic for any additions you may feel like adding and the area above Himem from 36267 to 37999 is also free.

(continued on next page)

(listing continued on next page)

(continued from previous page)

While use of the program's functions is largely self-explanatory, here is a brief description:

Insert: press Ctrl and [. The insertion will be made between the cursor and the character to its left. There are a maximum length of 255 characters or the number of available spaces on the page i.e., if the cursor was at the left of the bottom line the maximum length would be 80. The insertion will be shown at the bottom of the screen and will not be entered until Ctrl and [are pressed for a second time. It can be edited normally.

Delete: press Ctrl and]. Up to 255 characters can be deleted, starting with the character to the left of the cursor. Press Del until the cursor is under the last character to be deleted then Ctrl and]. If you move the cursor too far press the right cursor arrow.

Tab Stops: press Ctrl and Tab to set a tab stop or CLR to clear all tab stops. When Tab is pressed the cursor will advance to the next tab stop if one exists or else the beginning of the next line.

Cursor keys: they move the cursor one space or line in the given direction, within the confines of the margins and screen, without overwriting the text.

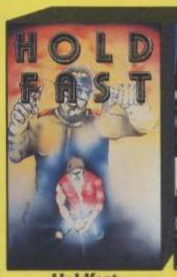
Copy key: gives a large range of options for printing a page or pages. If you load a file that is longer than the amount of room you have allocated for it, the machine code will be overwritten and the program will crash. If you are not using an Epson printer consult your printer manual and check lines 360 to 430. ■

(listing continued from previous page)

```
1070 GOTO 760
1080 LOCATE x1,y1:PRINT CHR$(PEEK(h));
1090 h=h+1:x1=x1+1
1100 GOTO 580
1110 x1=x1+1:i=i+1:GOTO 580
1120 FOR i1=1 TO 80:x1=x1+1:i=i+1:NEXT i1
1130 GOTO 580
1140 WINDOW SWAP 0,1
1150 insert1X:insert1
1160 if insert1=1 THEN 1230
1170 CLS:PRINT start insertion
1180 CALL 3417a
1190 lng1=peek(begin+right1-x1+(right1-left1-1)*(20-y1)
1200 bottom1=x1+20+(y1-y1)*(x1-x1)+(n2-n1)*3800
0
1210 MOVE 8*left1-9,63:DRAW 8*left1-9,20,1:MOVE 8*righ
t1+1,63:DRAW 8*right1+1,20
1
1220 GOTO 580
1230 REM end insert
1240 if x1>right1 AND x1<bottom1 THEN x1=x1+1:h=h+1
1250 lng1=lng1-left1+(right1-left1+1)*(y1-1)
1260 CLS #1
1270 IF lng1>0 THEN 1280 ELSE x1=20:y1=y2:h=h2:botto
m=20:GOTO 580
1280 first=top+left1-1
1290 FOR i9900,25a+i(first/25)-INT(first/25b)
1300 FOR i9904,INT(first/25b)
1310 wait25:PRINT right1+left1
1320 POKE i9905,ekl$
1330 POKE i9906,80-ekl$
1340 POKE i9907,lng1
1350 endoseq=20+(right1-left1+1)*34599
1360 FOR i9908,25a+i(endoseq/25a)-INT(endoseq/25a)
1370 POKE i9909,INT(endoseq/25a)
1380 endoseq=(20+(right1-left1+1)+right1-x2)*(1-lng
1)
1390 POKE i9910,25a+i(endoseq/25a)-INT(endoseq/25a)
1400 POKE i9911,INT(endoseq/25a)
1410 CALL 3a057
1420 x1=x2:y1=y2:h=h2:bottom1=20
1430 GOSUB 3430
1440 GOTO 570
1450 REM delete block
4a0 IF INSERT1=1 THEN 580 ELSE PRINT #1,"MOVE CURSOR
BY PRESSING DELETE OR ]"
4b4:2*3:"UNTIL IT IS BENEATH THE LAST CHARACTER TO BE
DELETED.THEN PRESS [?
4L AND "+CHR$(4)
1470 lng1=lng1+2:x1=x1+2:y1=y1
1480 x=INKEY$
1490 PRINT CHR$(22);CHR$(1)
1500 LOCATE x1,y1:PRINT " ";
1510 PRINT CHR$(22);CHR$(0)
1520 IF x$="" THEN 1490
1530 IF b#=CHR$(127) THEN 1540 ELSE IF b#=CHR$(124) T
HEN 1620 ELSE IF b#=CHR$(
29) THEN 1710 ELSE 1480
1540 IF lng1<255 THEN 1480 ELSE LOCATE x1,y1:PRINT CH
R$(PEEK(h));
1550 IF x1=left1 THEN 1580
1560 lng1=lng1-1
1570 x1=x1-1:h=h-1:GOTO 1480
1580 IF y1=y1 THEN 1480
1590 lng1=lng1-1
1600 y1=y1-1:x1=x1-(right1-left1)+1:GO
TO 1480
1620 LOCATE x1,y1:PRINT CHR$(PEEK(h));
1630 IF x1=x2 AND y1=y2 THEN PRINT CHR$(7);:GOTO 148
0
1640 IF x1=right1 THEN 1670
1650 x1=x1+1:h=h+1:lng1=lng1+1
1660 GOTO 1480
1670 IF y1=bottom1 THEN 1480
1680 y1=y1+1:x1=x1+(h+80-right1)+left1
1690 lng1=lng1+1
1700 GOTO 1480
1710 IF lng1=0 THEN 570
1720 endoseq=right1+20+(right1-left1+1)*(20-y1)
1730 POKE i9904,25a+i(endoseq/25a)-INT(endoseq/25a)
1740 POKE i9911,INT(endoseq/25a)
1750 topseq=left1+1
1760 POKE i9903,25a+i(topseq/25a)-INT(topseq/25a)
1770 POKE i9904,INT(topseq/25a)
1780 skip=left1-right1+79
1790 POKE i9905,skip
1800 POKE i9906,80-skip
1810 newcurs=3440+(x1-left1+(80-skip)+(y1-1)
1820 POKE i9912,25a+i(newcurs/25a)-INT(newcurs/25a)
1830 POKE i9913,INT(newcurs/25a)
1840 oldcurs=3440+(x2-left1+(80-skip)+(y2-1)
1850 POKE i9914,25a+i(oldcurs/25a)-INT(oldcurs/25a)
1860 POKE i9915,INT(oldcurs/25a)
1870 POKE i9916,lng1
1880 CALL 3a8f
1890 GOSUB 3430
1900 GOTO 570
1910 CLS #1:PRINT #1,"If print page/pages?","2) printe
r options?","3) scrap/chan
ge page/pages?","4) save/load page/pages?","5) change
margins?","6) quit?","7) s
croll pages?","8) catalog tape?","9) continue?"
1920 x$=INKEY$:IF x$="" OR x$="1" AND x$<"2" AND x$<
"7" AND x$<"4" AND x$<"
5" AND x$<"6" AND x$<"7" AND x$<"8" OR x$="9" THE
N 1920
1930 CLS #1:gl=VAL(x$):ON x$ GOTO 1940,2140,2620,2850,
3120,3490,3180,3320,570
1940 CLS #1:PRINT #1,"1) this page to cursor?","2) all
this page?","3) all nine
pages?","4) pages 1 to 3?","5) pages 1 to 9?","6) page
s 1 to 9?","7) cancel?"
1950 x$=INKEY$:IF x$="" OR x$<"1" AND x$<"2" AND x$<
"5" AND x$<"4" AND x$<"
5" AND x$<"6" AND x$<"7" THEN 1950
1960 CLS #1:gl=VAL(x$):ON x$ GOSUB 2020,2050,2040,2050
,2080,2110,570
1970 CLS #1:PRINT #1,"PLEASE WAIT"
1980 FOR i=start TO finish
1990 PRINT #0,CHR$(PEEK(i));
2000 NEXT i
2010 CLS #1:GOTO 570
2020 start=top+left1-1:finish=80+x1-1:RETURN
2030 start=top+finish+80-1595:RETURN
2040 start=20000:finish=34599:RETURN
2050 CLS #1:INPUT #1,"enter first and last pages seper
ated by a comma"page1$,pa
ge2$
2060 IF page1$<1 OR page2$ < 0 OR page1$>page2$ THEN 205
0
2070 start=18400+1600*page1$:finish=19999+1600*page2$:
RETURN
2080 CLS #1:INPUT #1,"Enter the last page that you wan
t printed"page2$
2090 IF page2$<1 OR page2$ < 0 THEN 2080
2100 start=20000:finish=19999+1600*page2$:RETURN
2110 CLS #1:INPUT #1,"Enter the first page to be print
ed"page1$
2120 IF page1$<1 OR page1$ < 0 THEN 2110
2130 start=18400+1600*page1$:finish=34399:RETURN
2140 REM printer options
2150 CLS #1:PRINT #1,"1) form feed?","2) set/reset ita
lics?","3) change line spa
cing?","4) advance 1 lines?","5) type pages?","6)
main options?","7) contin
ue?"
2160 x$=INKEY$:IF x$="" OR x$>"1" AND x$<"2" AND x$<
"3" AND x$<"4" AND x$<"
5" AND x$<"6" AND x$<"7" THEN 2160
2170 CLS #1:gl=VAL(x$):ON x$ GOTO 2190,2210,2250,2300,
2340,2410,570
2180 REM 1)
2190 PRINT #0,CHR$(12);:GOTO 2150
2200 REM italics
2210 IF ital=0 THEN PRINT #0,CHR$(27);"4";ELSE PRINT
#0,CHR$(27);"5";
2220 IF page1$<1 OR page2$<0 OR page1$>page2 THEN 221
0
2230 setb=setb:FOR delay=0 TO 1000:NEXT:PRINT #0,CHR
$(13);:GOTO 2150
2240 REM line separation
2250 CLS #1:PRINT #1,"Line separations is currently se
t at "spacel$"/72 of an i
nch."
2260 INPUT #1,"What value n/72 do wish to reset it to"
spacel$
2270 IF spacel$<0 OR spacel$>255 THEN 2260
2280 PRINT #0,CHR$(27);"A";CHR$(spacel);:PRINT #0,CHR
$(13);:GOTO 2150
2290 REM advance 1 lines
2300 CLS #1:INPUT #1,"how many lines do you want to ad
vance the paper"l1
2310 IF l1<1 THEN 2300
2320 FOR n1=1 TO l1:PRINT #0,CHR$(10);:NEXT n1:GOTO 21
50
2330 REM screen options
2340 CLS #1:PRINT #1,"1) set/reset emphasis?","2) set/
reset double strike?","3)
change type size?","4) printer options?","5) main opti
ons?","6) continue?"
2350 x$=INKEY$:IF x$="" OR x$<"1" AND x$>"2" AND x$<
"3" AND x$<"4" AND x$<"
5" AND x$<"6" THEN 2350
2360 CLS #1:gl=VAL(x$):ON x$ GOTO 2380,2430,2480,2150,
1910,570
2370 REM set/reset emphasis
2380 emphasis=1-emphasis:
2390 IF emphasis=1 THEN PRINT #0,CHR$(27);"E";ELSE P
RINT #0,CHR$(27);"F";
2400 IF emphasis=1 THEN PRINT #1,"Print is now emphas
ized.";ELSE PRINT #1,"Prin
t is now normal."
2410 FOR delay=0 TO 1000:NEXT:PRINT #0,CHR$(13);:GOTO
2340
2420 REM ds
2430 strike1=-strike1
2440 IF strike1=1 THEN PRINT #0,CHR$(27);"G";ELSE PRI
NT #0,CHR$(27);"H";
2450 IF strike1=1 THEN PRINT #1,"Printing is now in do
uble strike mode.";ELSE PR
INT #1,"Printing is now in normal mode."
2460 FOR delay=0 TO 1000:NEXT:PRINT #0,CHR$(13);:GOTO
2340
2470 REM change type size
2480 CLS #1:PRINT #1,"1) pica","2) elite","3) enlarg
ed pica","4) enlarged elit
e","5) printer options?","6) main options?"
2490 PAINT(1,WARNING):CHARACTER SIZE MAY NOT BE SUITE
D TO YOUR PAPER WIDTH. MA
KING SHOULD ALSO BE CHANGED SO THAT LEFT AND RIGHT E
DGES OF DIFFERENT TYPE SIZ
ES COINCIDE."
2500 x$=INKEY$:IF x$="" OR x$<"1" AND x$>"2" AND x$
<"5" AND x$<"4" AND x$<
5" AND x$<"6" THEN 2500
2510 CLS #1:gl=VAL(x$):ON x$ GOTO 2520,2520,2520,2520,
2150,1910
2520 IF type1=3 OR type1=4 THEN PRINT #0,CHR$(27);"W";
CHR$(0);
2530 type1=gl:ON x$ GOTO 2550,2570,2590,2610
2540 REM pica
2550 PRINT #0,CHR$(27);"P";PRINT #0,CHR$(13);:GOTO 21
50
2560 REM enlarged pica
2570 PRINT #0,CHR$(27);"P";PRINT #0,CHR$(27);"W";CHR$
(1);PRINT #0,CHR$(13);:GO
TO 2150
2580 REM enlarged elite
2590 PRINT #0,CHR$(27);"M";PRINT #0,CHR$(27);"W";CHR$
(1);PRINT #0,CHR$(13);:GO
TO 2150
2600 REM enlarged elite
2610 PRINT #0,CHR$(27);"M";PRINT #0,CHR$(27);"W";CHR$
(1);PRINT #0,CHR$(13);:GO
TO 2150
2620 CLS #1:PRINT #1,"1) scrap this page?","2) scrap a
ll pages?","3) next page?
",4) previous page?","5) page 1?","6) main options?",
7) continue?"
2630 x$=INKEY$:IF x$="" OR x$<"1" AND x$>"2" AND x$<
"3" AND x$<"4" AND x$<"
5" AND x$<"6" AND x$<"7" THEN 2630
2640 CLS #1:gl=VAL(x$):ON x$ GOTO 2650,2700,2720,2760,
2800,1910,570
2650 POKE i9903,25a+i(top/25a)-INT(top/25a)):POKE i990
2,INT(top/25a)
2660 CALL 3a018:CLS:GOSUB 3410
2670 x1=left1:y1=line1:h=left1-1
2680 LOCATE 1,21:PRINT n$;
2690 GOTO 570
2700 PRINT #1,"ARE YOU SURE? (Y or N)"
2710 x$=INKEY$:IF x$="" OR x$="y" THEN 4k0 ELSE IF x$
="N" OR x$="n" THEN 2620 E
LSE GOTO 2710
2720 IF page1$=0 THEN page1$=0
2730 page1$=page1$+1:top=18400+1600*page1$:h=top+left1-1:
x1=left1:y1=1
2740 CLS #1:GOSUB 3430
2750 GOTO 570
2760 IF page1$=1 THEN page1$=10
2770 page1$=page1$-1:top=18400+1600*page1$:h=top+left1-1:
x1=left1:y1=1
2780 CLS #1:GOSUB 3430
2790 GOTO 570
2800 CLS #1:INPUT #1,"which page do you want to change
to"page1$
2810 IF page1$<1 OR page1$>9 THEN 2800
2820 top=18400+1600*page1$:h=top+left1-1:x1=left1:y1=1
2830 CLS #1:GOSUB 3430
2840 GOTO 570
2850 CLS #1:PRINT #1,"1) save?","2) load?","3) contin
u?"
2860 x$=INKEY$:IF x$="" OR x$<"1" AND x$>"2" AND x$<
"3" THEN 2860
2870 CLS #1:gl=VAL(x$):IF gl<3 THEN 570
2880 CLS #1:PRINT #1,"1) this page?","2) all nine pag
es?","3) pages 1 to 3?"
2890 IF gl<3 THEN PRINT #1,"WARNING:CONTENTS OF FREE
ENT PAGE/PAGES WILL BE OVE
RWRITTEN":PRINT #1,"WARNING: THE LENGTH OF THE FILE M
UST BE COMPATIBLE WITH YOU
R CHOICE! IF THE FILE EXCEEDS THE AVAILABLE SPACE
THE PROGRAM WILL CRASH!!"
2900 x$=INKEY$:IF x$="" OR x$<"1" AND x$>"2" AND x$
<"3" THEN 2900
2910 x$=VAL(x$):ON x$ GOSUB 3450,3060,3080
2920 CLS #1:PRINT #1,"what is the filename"n$
2930 IF n$="" THEN 570
2940 REM save a page
2950 WINDOW SWAP 0,1:CLS
2960 SAVE n$,a,start,length
2970 CLS
2980 WINDOW SWAP 0,1:GOTO 570
2990 REM load a page
3000 WINDOW SWAP 0,1:CLS
3010 LOAD n$,start
3020 CLS:WINDOW SWAP 0,1
3030 x1=left1:y1=line1:h=top+left1-1:GOSUB 3430
3040 GOTO 570
3050 start=top:length=1600:RETURN
3060 start=20000:length=14400:IF opt3=2 THEN top=20000
3070 RETURN
3080 CLS #1:INPUT #1,"Enter the first and last pages s
eparated by a comma"first
x,lastx
3090 IF first>1 OR lastx>9 OR first>lastx THEN 3080
3100 start=18400+1600*first:length=(lastx-first)*16
00:IF opt3=2 THEN top=sta
rt:page1$=first
3110 RETURN
3120 LOCATE x1,y1:PRINT CHR$(PEEK(h));
3130 GOSUB 3340
3140 x1=left1:y1=1
3150 h=top+left1-1
3160 GOSUB 3430
3170 GOTO 570
3180 REM scroll pages
3190 CLS #1:PRINT #1,"1) from present page?","2) from
page 1?","3) cancel?"
3200 x$=INKEY$:IF x$="" OR x$<"1" AND x$>"2" AND x$<
"3" THEN 3200
3210 CLS #1:gl=VAL(x$):ON x$ GOTO 3220,3290,570
3220 CLS #1:PRINT #1:PRINT #1,"PRESS SPACE BAR TO CONT
INUE SCROLLING, ANY OTHER
KEY TO STOP ON DISPLAYED PAGE."
3230 PRINT #2,"page "page1$:GOSUB 3430
3240 x$=INKEY$:IF x$="" THEN 3240
3250 IF x$<" " THEN 3260 ELSE CLS #1:GOTO 3300
3260 page1$=page1$+1:IF page1$>10 THEN page1$=1
3270 top=18400+1600*page1$
3280 GOTO 3230
3290 top=20000:page1$=1:GOTO 3220
3300 h=top+left1-1:x1=left1:y1=1:GOTO 570
3310 clab1$=left1$:RETURN
3320 WINDOW SWAP 0,1:CLS
3330 PRINT "press ESC to stop catalogue."
3340 ON BREAK GOSUB 3380
3350 CAT
3360 WINDOW SWAP 0,1:GOTO 570
3370 left1=right1=72
3380 RETURN
3390 PRINT CHR$(7);:CLS #1:INPUT #1,"enter left then r
ight margin seperated by
a comma"left1,right1:CLS #1
3400 IF left1<1 OR right1>80 OR left1>=right1 THEN 339
0 ELSE RETURN
3410 MOVE 8*left1-9,80:DRAW 8*left1-9,40,1:MOVE 8*rig
ht1+1,80:DRAW 8*right1+1,4
0,1
3420 RETURN
3430 POKE i9903,25a+i(top/25a)-INT(top/25a))
3440 POKE i9902,INT(top/25a)
3450 LOCATE 1,1
3460 CALL 3a057
3470 GOSUB 3410
3480 RETURN
3490 MODE 2:END
3500 ON BREAK STOP
3510 RETURN
3520 CAT
```

the only choice

Kuma AMSTRAD CPC464 software



Holdfast

Gems of Stradus

Star Avengers

Galaxia

Music Composer

Logo

Database

ZEN Assembler

EASIVAT

Home Budget

An outstanding selection from Kuma's rapidly expanding range of Entertainment and Application Software for the Amstrad CPC464 Micro-computer.

Book:

● The Amstrad CPC 464 Explored

This superb book is designed to let every CPC464 user, at whatever level, get the most from his computer. After an introductory section on the special Basic features, the book looks in depth at the excellent sound and graphic facilities including: ***● Animation ● Windows ●Character sets ● Multitasking ● 3 Voice Times ● M/C routines for Basic ● Use of Zen ● Use of O/S ● Sample programs***

Available from your nearest Amstrad CPC464 Stockist.

Kuma Computers Ltd., 12 Horseshoe Park, Horseshoe Road, Pangbourne, Berks RG8 7JW.

Please send full catalogue on Amstrad CPC464 products.

Name .....

Address .....

..... Phone.....

Trade Enquiries Phone 07357-4335

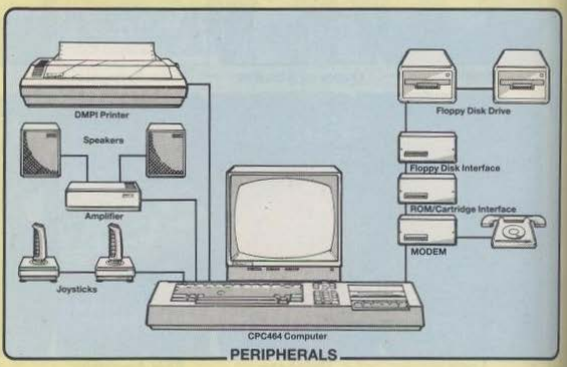
After everything that's been said in praise of Amstrad's CPC464, is there anything to add?

Plenty.

The CPC464 is an enthusiast's dream come true.

Few applications are beyond its capabilities, with its sophisticated features, complete expansion bus connector for sideways ROMs, serial interfaces, disk drives and modems.

No wonder the press is in raptures over it.



The CPC464 system.

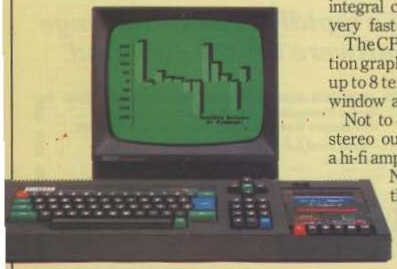
It comes complete and ready-to-go. Here's what you get for that incredibly low price.

64K of RAM (42K available), 32K of ROM, colour monitor or green screen VDU, typewriter style keyboard, integral cassette data recorder and a very fast extended BASIC.

The CPC464 offers you high resolution graphics, 80 column text display, up to 8 text windows plus a graphics window and a palette of 27 colours.

Not to mention a 3-voice, 7-octave stereo output you can feed through a hi-fi amplifier and speakers.

Now we think you'll agree, that's some system.



CPC464 green screen VDU (GT64)

Low cost disk drive.

An inexpensive floppy disk system is available which includes CP/M* (giving you the option to access 3000 proven programs) and LOGO with its famous educational applications.

Optional disk drive DDI-1 including interface CP/M* and LOGO £199.95

£239

Computer complete with green screen VDU (GT64)

£349

Computer complete with colour monitor (CTM640)

CPC 464 complete with monitor and datacorder

Printer port.

The CPC464 has a built-in standard parallel printer interface which offers you the facility to provide permanent reference of program listings, letters, invoices, anything that requires 'hard copy'.

Optional 80 column dot matrix printer DMP-1 operates at up to 50 characters per second. Combined with the CPC464, it offers a high performance text processing system for only £199.95.

Joysticks. Power supply modulator.

You can bring those arcade games stunningly to life with the optional joystick controller which has a socket for a second stick.

The optional power supply and modulator enables the CPC464 to be connected to any home colour TV.

Amsoft. Fast growing software.

The high quality software takes full advantage of the CPC464's high specification and speedloading capability. Which means even complex programs can be loaded quickly.

A range of software is already available. And it's growing rapidly.

Educational programs, business applications and arcade games are all designed to utilise the CPC464's impressive graphics, sound and processing abilities.

Amstrad Club Membership.

Whether you're interested in commercial applications or you're a games fanatic, you'll want to join the Club.

Members enjoy immediate benefits like the privilege card, Club binder, regular magazine, competitions for valuable prizes and contact with other Amstrad users.

BOOTS COMET Dixons
Menzies **RUMBELOWS** AND OTHER COMPUTER STORES

AMSTRAD

ONE GREAT IDEA AFTER ANOTHER

*Trade mark Digital Research

I'd like to know more about the exciting CPC464 complete computer system. Please send literature right away.

NAME YC3

ADDRESS

POSTCODE

To: Amstrad Consumer Electronics plc, Brentwood House, 169 King's Road, Brentwood, Essex CM14 4EF. Tel: Brentwood (0277) 228888.

Figure 3. List of DMACTL and GRACTL options.

GRACTL Poke No.	LOCATION 53277 Action
1	enable missiles
2	enable players
3	enable players + missiles

E.G. Poke 53277, 2 enables players.

DMACTL Add to the contents of DMACTL	LOCATION 559 Action
+4	enable missiles
+8	enable players
+12	enable players + missiles
+16	enable single resolution
+0 (default)	enable double resolution

E.G. Poke 559, Peek (559) + 12 + 16 enables players + missiles in single resolution.

The default for DMACTL, from power on or from system reset is 34.

Figure 4. Other player/missile registers.

Name(s)	Location(s)	Purpose
HPOSP0 (–3)	53248-51	Player horizontal Position Registers
HPOSM0 (–3)	53252-55	Missile horizontal Position registers
Size P0 (–3)	53256-59	Player size Registers
Size M	53260	Missile size Register
COLPM0 (–3)	704-707	Player/missile Colour registers

Figure 5. Priority Register.

Prior location 623

Priorities in this order

PF0, PF1, P0-3, PF2-3, background — 8

PF0-3, PO-3, background — 4

P0-1, PF0-3, P2-3, background — 2

P0-3, PF0-3, background — 1

E.G. Poke 623,2

PF = Playfield i.e. colours 0-3

P = Player 0-3

Figure 6. Collision Registers.

Location	Collision detection
53248	M0 to playfield
53249	M1 to playfield
53250	M2 to playfield
53251	M3 to playfield
53252	P0 to playfield
53253	P1 to playfield
53254	P2 to playfield
53255	P3 to playfield
53256	M0 to player
53257	M1 to player
53258	M2 to player
53259	M3 to player
53260	P0 to player
53261	P1 to player
53262	P2 to player
53263	P3 to player

53278 — HITCLR — Poke with any to clear collision registers.

Figure 7.

PMSTART = START + (512 + (512*RES)) + PLAYER (128 + (128*RES))

MSB = INT (PMSTART/256)

LSB = PMSTRT – (MSB*256)

FOR T = TO 6

READ A,B

POKEA,MSB:POKEB,LSB:NEXT T

DATA 1562, 1561, 1569, 1568, 1580, 1579, 1605, 1604, 1612, 1611, 1623, 1622

RETURN

Patrick Nevison helps your screen come alive with Atari animation

ANIMATION WITH most personal computers is a time consuming and tedious process. To make a finely detailed image move across the screen involves the following process:

- ☐ Look at the background ahead of the image and temporarily store the contents.
- ☐ Erase the old image — draw in the background colour.
- ☐ Draw the new image.
- ☐ Restore the background at the previous image position.
- ☐ Repeat from step 1.

An example of this type of animation is given in listing 1. There has to be an easier and faster method. Machine code is one answer but is not easy to write or debug and one error can be catastrophic. Atari owners, among others, have a solution in hardware. Sprite, or as Atari call them player/missile graphics. A player is a graphic object which is shape and colour definable, and when moved over any background — playfield — image does not erase or alter it in any way. Type in listing 2 and see the same animation but using player graphics. In fact, there is a delay loop in listing 2 to make the two comparable.

So, what do we have in Atari computers — four user-definable objects all of independent colour, independent shape, moving rapidly anywhere in any graphics mode without disturbing anything else. Sounds too good to be true. In fact, there are a few complications. Atari Basic is now showing its age against newer structured and more capable Basics.

Specifically, as regards P/M graphics, there are no commands to deal with this type of animation in Atari Basic. Thus, all dealings with P/M are done with the immortally incomprehensible Peek and Poke. Never fear, although the details are tedious and time consuming — though well worth it for the displays they make — the principles are quite straightforward.

As Atari Basic does not recognise P/M graphics, we must cordon off an area of memory to hold all of the data, so that Basic does not corrupt the information. The high end of memory is ideal for this and location 106 contains the number of "pages" — 256 bytes to a page — free at any one time. In changing the contents of location 106 we fool the computer into thinking it has less memory than is actually there, thus providing a safe place to store all of the P/M data.

Players are all eight bits — dots, pixels, whatever — wide, but can come in two heights. They are up to 128 bits high — double resolution — or up to 256 bits high — single resolution. There are swings and roundabouts in choosing which type you will

ATARI

Listing 1.

```
10 REM LIST 1
20 GRAPHICS 7+16
30 FOR T=1 TO 100
35 REM DRAW IMAGE
40 COLOR 1
50 PLOT T,30:DRAWTO T+5,30:DRAWTO T+6,31:DRAW
TO T-1,31
60 DRAWTO T-1,32:DRAWTO T,32:PLOT T+2,32:DRAW
TO T+3,32
70 PLOT T+5,32:DRAWTO T+6,32:DRAWTO T+8,33:DR
AWTO T-1,33:DRAWTO T-1,34
80 PLOT T+1,34:DRAWTO T+4,34:PLOT T+6,34:DRAW
TO T+6,35:DRAWTO T+5,35
90 PLOT T,35:DRAWTO T-1,35:DRAWTO T-1,36:DRAW
TO T+6,36:DRAWTO T+5,37:DRAWTO T,37
100 REM ERASE IMAGE
110 COLOR 0
120 PLOT T,30:DRAWTO T+5,30:DRAWTO T+6,31:DRA
WTO T-1,31
130 DRAWTO T-1,32:DRAWTO T,32:PLOT T+2,32:DRA
WTO T+3,32
140 PLOT T+5,32:DRAWTO T+6,32:DRAWTO T+8,33:D
RAWTO T-1,33:DRAWTO T-1,34
150 PLOT T+1,34:DRAWTO T+4,34:PLOT T+6,34:DRA
WTO T+6,35:DRAWTO T+5,35
160 PLOT T,35:DRAWTO T-1,35:DRAWTO T-1,36:DRA
WTO T+6,36:DRAWTO T+5,37:DRAWTO T,37
170 NEXT T
180 GOTO 30:REM LOOP ENDLESSLY
```

Listing 2.

```
10 REM LIST 2
20 A=PEEK(106)-4:POKE 106,A:GRAPHICS 2+16:REM
 SET ASIDE P/M AREA
30 PMSTART=A*256
40 REM CLEAR PLAYER 0 AREA
50 START=PMSTART+512
60 FOR T=START TO START+128:POKE T,0:NEXT T
70 REM DEFINE PLAYER
80 FOR T=START+30 TO START+30+7
90 READ N
100 POKE T,N
110 NEXT T
120 DATA 126,255,219,255,189,195,255,126
130 REM SET PMBASE
140 POKE 54279,A
150 REM SET DMACTL
160 POKE 559,42
170 REM SET GRACTL
180 POKE 53277,2
190 REM SET PLAYER 0 COLOUR
200 POKE 704,14
210 REM MOVE PLAYER 0
220 FOR T=70 TO 180
230 POKE 53248,T
240 REM DELAY--SLOW IT DOWN
250 FOR D=1 TO 50:NEXT D
260 NEXT T
270 GOTO 200
```

Figure 1. Player missile memory map.

Listing 3.

```
0 REM LIST 3
9 REM SET ASIDE 1K FOR PM TABLE
10 PAGES=PEEK(106)-4:POKE 106,PAGES:GRAPHICS
3
11 POKE 752,1:REM TURN OFF CURSOR
19 REM CALC START ADDR.FOR PM TABLE
20 PMTABLE=PAGES*256
29 REM START ADDR. PLAYER 0
30 START=PMTABLE+512
39 REM CLEAR PLAYER 0 AREA
40 FOR T=START TO START+128:POKE T,0:NEXT T
49 REM VERT POSN. PLAYER 0
50 VERT=90
59 REM READ PLAYER DEFN.TO TABLE
60 FOR T=START+VERT TO START+VERT+7:READ A:PO
KE T,A:NEXT T
69 REM PLAYER IMAGE DATA
70 DATA 126,255,219,255,189,195,255,126
89 REM SET UP BACKGROUND
90 COLOR 1:PLOT 32,2:DRAWTO 32,20
100 COLOR 2:PLOT 22,2:DRAWTO 22,20
110 COLOR 3:PLOT 12,2:DRAWTO 12,20
119 REM SET PMBASE
120 POKE 54279,PAGES
129 REM SET DMACTL
130 POKE 559,46
139 REM SET GRACTL
140 POKE 53277,2
149 REM PLAYER 0 COLOUR
150 POKE 704,14
159 REM SET HORIZONTAL POSITION
160 HPOSP0=53248
169 REM SET PRIORITY
170 POKE 623,4
179 REM MOVE PLAYER-CHECK COLLISIONS
180 FOR T=190 TO 40 STEP -1
190 POKE HPOSP0,T
200 ? "COLLISION ";PEEK(53252)
209 REM RESET USING HITCLR
210 POKE 53278,1
220 NEXT T
229 REM LOOP ENDLESSLY
230 GOTO 180
```

Listing 4.

```
0 REM LISTING 4  PM VERT MOVE ROUTINE
10 GOSUB 25150:REM INSTALL VERT MOVE ROUTINE
20 POKE 106,6:REM RESERVE RAM FOR TABLE
30 ? "I"+PEEK 752,1:POKE 710,4:POKE 709,0:REM
 CLEAR SCREEN
```

(continued on page 131)

use. Double resolution uses less memory — 1K in total for all four players — and is faster to animate, but its resolution or image quality is poorer.

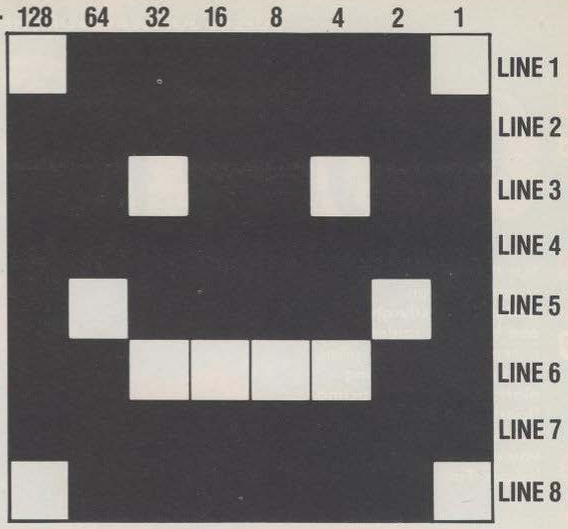
The single resolution players use 2K of memory, are slower to move out have a better quality image. For the sake of argument, I will discuss double resolution and point out where details differ between the two types. So, we need to set aside 1K of memory for the player missile table. This 1K is equal to four pages of memory — 4 × 256 = 1024 = 1K — hence:

```
A = PEEK(106)-4 : POKE 106,A ( – 8 for single
                                resolution)
```

will "hide" our P/M table from Basic. We then must tell the computer, actually the Antic video chip, exactly where in memory our table is located. Location 54279 is called the Player Missile Base Address Register — PMBase. Using our previously defined variable A, give the instruction,

```
POKE 54279,A
```

This is in fact just the start address of the table, and figure 1 shows how each of the players and missiles are located in the table. You will notice that the Player areas do not start until half way down the table. The first 384 bytes — 768 for single resolution — are unused, but can make a valuable place for storing machine code routines or tables of data as Basic leaves all areas above PMBase untouched.



NIMATION

Locations 384-512 in the table are the Missile definitions. The next step after making your table secure is to clear the areas to be used. On many computers, when you turn them on much of the memory is filled with random numbers.

This will affect the Player image and so they must be cleared. You do not need to clear all of the table, just the parts you are going to use. For example, if you are only going to use the first 2 players, the instructions would read something like,

```
FOR T = A*256+512 TO
A*256+768
POKE T,0
NEXT T
```

The definition of the player's image is perhaps the most difficult part to grasp straight away, but is crucial to fully exploiting player/missile animation. Examine figure 2 which gives a simple Player definition. All players are eight bits wide and I have made this one eight bits high. The definition runs from top to bottom: Each horizontal line — eight bits wide always — has its "on" bits coloured.

These bits are then added up from left to right according to the Binary number system. So each horizontal "slice" of the definition ends up having a number to define it. Each of these bytes is then Poked into the relevant section in the P/M table. These "bit maps" have to be positioned in each section according to the vertical position on the TV.

If you put the definition at the start of the section of the table, the image will appear at the very top of the TV screen. Place your definition in the centre of the table and it will appear in the centre of the screen, and so on.

As an example. If the beginning of Player 0 section of the table in memory is given by the variable START, and we want to place the image 10 dots from the top of the screen, we would have

```
FOR T=START+10 TO START+10+7
READ N
POKE T,N
NEXT N
DATA 126,255,219,255,189,195,255,126
```

The players can be placed, or moved about anywhere within their own section, and this is how vertical motion is achieved, but it is up to the programmer to make sure that they do not move into another player's area. Horizontal motion is very much easier. Each player has a Horizontal Position Register — HPOSPO to HPOSP3. To move Player 0 from left to right, simply increase the number in location 53248.53249-51 to cover the other players. The colours of the players and missiles are read from 704-707. The colours follow the standard Atari colour numbers:

```
POKE 704,COLOUR*16+LUMINANCE
```

where Colour = 0 to 15 and Luminance = 0 to 15.

Each player also has a Size register (53256-59). 0 = Normal width, 1 = Double width and 3 = Quadruple width. Experiment with this to see its effect.

The missiles mentioned before behave in most respects like miniature players. They are only two bits wide. They have their own horizontal position registers, but take the colour of their associated player, and have only one size register, making all four missiles the same width.

When using PM graphics, one drawback is that the Antic video chip "steals" time from the main 6502 chip to move and display them. This means that when P/M are in use all other functions will slow down slightly. Consequently, Atari has made the use of P/M optional. Two auxiliary registers are used to switch P/M graphics on and off. Graphics Control Register — GRACTLY — and Direct Memory Access Control Register — DMACTL. These must be enabled before P/M can be used. A list of the various Pokes and their effect are given in figure 3. A summary of the other P/M Registers is given in figure 4.

(continued on page 131)

MICROPOWERMICROPOWERM
SUPERB SOFTWARE FOR THE
AMSTRAD
SUPER-FAST LOADING TIME
commodore 64
electron
B.B.C. MICRO
GHOULS
Run through the creepy mansion dodging ghostly ghouls and bouncing spiders. Leap over poison-smeared spikes, scamper along moving platforms and contracting floorboards, and use powerful springs to propel you onto overhanging ledges. Four screens.
Amstrad and Commodore versions £6.95
BBC and Electron versions £7.95
BBC and Commodore Disk price £9.95
Amstrad version
WATCH OUT FOR OUR NEW PACKAGING AND CATALOGUE
MICRO POWER
MICRO POWER LTD., NORTHWOOD HOUSE, NORTH STREET, LEEDS LS7 2AA TEL: (0532) 458800
SELECTIVE BRANCHES OF BOOTS, CO-OP, MENZIES, W. H. SMITH, WOOLWORTHS AND ALL GOOD DEALERS.
AUTHORS! WE PAY 20% ROYALTIES!
MICROPOWERMICROPOWERM

(continued from page 129)

One of the most useful qualities that P/M graphics offers to games programmers is that of automatic "collision detection". Collision is the name given when any player or missile occupies the same position on the screen as any other Player, Missile or any of the screen colours — playfield. When a collision occurs the computer automatically sets the appropriate register and all the programmer has to do is Peek that register to see if the collision has occurred.

Listing 3 shows this collision detection at work by moving player 0 across 3 vertical lines drawn in different colours. The text window shows the state of the collision detection register. Also shown in this program is another very powerful P/M technique known as Priority.

Priority means that when a Player and another object collide — either another player, missile or playfield colour — it will appeal to pass either behind of or in front of the other object. Used properly this can make a very attractive tool. A list of some of the priority settings is given in figure 5. Figure 6 gives all of the Collision Detection Registers. The register you are scanning may give one of several values, depending on which object your player has collided with.

For Example, location 53252 = PO to playfield — is the register displayed in the text window in listing 3, and depending which coloured bar the player is in contact with the register will contain a different value. A complete list of all possible collisions of players, missiles and playfield colours is too long to publish here, but experiment yourself and you will find that perhaps you only need to use a couple of registers depending on what program you are using them in. When a collision has occured all collision registers have to be reset by Poking any number into HITCLR location 53278.

Just a word on the difference between TV sets. All TVs are subject to a thing called Overscan. This means that all TV pictures are not centred perfectly — particularly among the cheaper makes — and is the reason why all computers designed to be used with TVs and not exclusively monitors have a border around the screen. Player Missile graphics are not restricted to the main screen area and can go beyond the border.

All of the combinations of the horizontal registers only the positions 40-190 will be visible on the screen. Take care that if you are writing software that will be used by other people on differing screens, not to use the areas of screen beyond the normal borders for playfield graphics or text, for if their TV is different from yours, they may miss the images off to one side of their screen. Happily, a good use can be put to Overscanning.

If you execute any Graphics instructions after setting up your P/M graphics you will have to reset PMBase, GRACTL and DMACTL. This only takes a very short time, but can cause an annoying "flicker" from any player or Missile on the screen. This is solved by setting the Horizontal positions of the players and missiles so that they are off the visible screen area while you reset Graphics modes and the auxiliary registers.

Only one problem remains to speed P/M animation from basic vertical movement. To animate vertically we need to move the whole bit map of the player or missile higher — down the screen — or lower — up the screen — within its relevant section in the Player Missile table.

A machine-code subroutine is the only way of achieving this speed. Such a routine is listing 4. This can be integrated into your own programs, and movement is achieved by passing variables through a USR command.

Finally, listing 5 gives a player editor program. This allows you to design a player up to 20 bits high using a joystick in port 1. Colour, resolution — single or double — and width are all changeable from the function keys, allowing you to see exactly how the player will look on the screen. Data from the image is given to include in your own program. Instructions are in the program.

Listing 4 is only equipped to deal with one player at a time. Embedded in the routine is an address which assumes that the player section of the table starts at 15872. This is equivalent to the highest place in memory that a 16K machine can place a double resolution player 0. To accommodate a different player and/or a different amount of RAM, 12 numbers have to be changed.

Add the short Basic routine below to your program and call this routine whenever you wish to change the player that you are moving vertically. Three variables need to be passed on to the routine. Start being the beginning of the entire P/M table in memory. Player being the player number you wish to use — 0, 1, 2 or 3. Res is 0 for double resolution and 1 for single. The routine can be placed anywhere in your program and called by a Gosub command, and ending the routine with a Return command — see figure 7.

There are two places to call the machine-code routine from.

To move down the screen (up in memory) call

A = USR(1536,LENGTH,HEIGHT,SPEED)

To move up the screen (down in memory) call

A = USR(1588, LENGTH, HEIGHT, SPEED)

The three variables Length, Height and Speed must be updated by the user's Basic program.

Length is the number of bytes offset from the start of the players section in the table, to the actual start of the player.

Speed is the number of points or spaces to move the player up or down in any one call. Length and Speed will probably remain constant throughout a program, though they need not. But every time a vertical move is made, the Height variable must be updated.

A = USR (1536, LENGTH, HEIGHT, SPEED): HEIGHT = HEIGHT + SPEED

or A = USR (1588, LENGTH, HEIGHT, SPEED): HEIGHT = HEIGHT — SPEED

(listing 4 continued from page 129)

```
35 POSITION 0,10:? "INSERT JOYSTICK INTO PORT
1";? "AND PLAYER";? "-DOWN PLAYER"
40 START=A0*256:P0=START+512
50 FOR T=P0 TO P0+128:POKE T,0:NEXT T:REM CLE
AR PLAYER 0 AREA
60 HEIGHT=10:SPEED=3:LENGTH=8
65 RESTORE 90
70 FOR T=P0+HEIGHT TO P0+HEIGHT+7
80 READ A:POKE T,A:NEXT T:REM DEFINE PLAYER 0
90 DATA 129,255,219,255,189,195,195,126
100 POKE 54279,START/256
110 POKE 53277,2
120 POKE 559,42
130 POKE 53248,100
140 POKE 704,14
150 A=USR(0):IF A=15 THEN 150
160 IF A=13 THEN A=USR(1536,LENGTH,HEIGHT,SPE
ED):HEIGHT=HEIGHT+SPEED
170 IF A=14 THEN A=USR(1588,LENGTH,HEIGHT,SPE
ED):HEIGHT=HEIGHT-SPEED
180 POSITION 0,0:? "HEIGHT";HEIGHT; " :GOTO
150
25150 REM DATA FOR P/M VERT MOVE ROUTINE
25151 REM EVERY OCCURENCE OF 0,62 IS THE ADDR
ESS OF PLAYER 0 SECTION OF THE TABLE
25152 REM SINCE &2X256&0=15872
25153 RESTORE 25160
25155 FOR T=1536 TO 1630:READ A:POKE T,A:NEXT
T:
25160 DATA 104,104,104,133,203,104,104,133,20
4,104,104,133,205,165,204,24,101,203,133,204,
198,204
25161 DATA 164,204,185
25162 DATA 0,62
25163 DATA 133,206,169,0,153
25164 DATA 0,62
25165 DATA 165,206,166,205,200,202,208,252,15
3
25166 DATA 0,62
25167 DATA 198,204,198,203,208,227,96
25168 DATA 104,104,104,133,203,104,104,133,20
4,104,104,133,205,164,204,185
25169 DATA 0,62
25170 DATA 133,206,169,0,153
25171 DATA 0,62
25172 DATA 165,206,166,205,136,202,208,252,15
3
25173 DATA 0,62
25174 DATA 230,204,198,203,208,227,96
25175 RETURN
```

Listing 5.

```
10 REM ************************
20 REM #4 ATARI SPRITE EDITOR ##
30 REM #& (C) 1983 PAT WEIDEMAN#
40 REM ************************
50 GOSUB 10000:REM SET UP VARIABLES
60 GOSUB 11000:REM DRAW SCREEN+BITMAP
70 POKE 53248,0
100 REM MAIN EDITOR LOOP
105 POSITION COL,0:? "*:POSITION 24,ROW:? "
110 IF STRIG(0)=0 GOSUB STRIB:GO
120 IF S=15 AND S0=1 THEN 200:REM SOTO SCRAM
COMMOLE KEYS
130 GOTO 300:REM JOYSTICK EDITING
200 COM=PEEK(53279):IF COM=7 OR COM=6 THEN 10
0:REM NO CONSOLE KEY PRESSED
205 POSITION 2,22:? "JUST A SECOND..":GOSUB 1
3000:REM UPDATE PMDATA
210 IF COM=3 THEN POKE 53248,180:GOSUB 20000:
REM OPTION PRESSED GOTO VIEW MENU
220 IF COM=5 THEN 100:REM NOT SELECT
230 ? "3";? "     PLAYER DATA   BYTE NUMBER"
240 FOR T=1 TO 20:? "                 *;ASC(PMDATA(T
,T));,"   ";T
250 NEXT T
260 ? ? ? " PRESS SPACE TO RETURN TO EDITOR";
270 POKE 764,255
280 IF PEEK(764)=255 THEN 280
290 GOSUB 11000:GOTO 100
300 REM JOYSTICK EDITING
310 IF S=5 OR S=6 OR S=9 OR S=10 THEN 100
315 IF S0=0 THEN 400
320 POSITION COL,0:? "*:POSITION 24,ROW:? "
*
330 IF S=14 THEN ROW=ROW+1:ROW=20:
340 IF S=13 THEN ROW=ROW-1:ROW=20:
350 IF S=11 THEN COL=COL-1:COL=20:
360 IF S=7 THEN COL=COL+1:COL=33:
370 POSITION COL,0:? "*:POSITION 24,ROW:? "
*
380 GOTO 100
400 REM FILL CURSOR
410 LOCATE COL,ROW,DOT:IF DOT=160 THEN POSITI
ON COL,ROW:? "*:GOSUB 16000:GOTO 100:REM ERA
SE DOT FROM BIT MAP
420 LOCATE COL,ROW,DOT:IF DOT=32 THEN POSITIO
N COL,ROW:? " ":GOSUB 17000:GOTO 100:REM FILL
DOT ON BIT MAP
10000 REM SET UP VARIABLES
10010 PMBASE=A*256:POKE 106,PMBASE:GRAPHICS 0:PO
KE 710,0:POKE 752,1
10015 POSITION 12,12:? "INITIALISING..."
10020 DIM PMDATA(25):COL=27:ROW=2
10030 DIM PM$(180):PM$=" ":PM$(179)=" ":PM$(2
)=PM$
10040 GOSUB 13000:REM CHANGE PM$ TO PMDATA
10050 HPO=180:COLPO=54:RES=1
10060 CL=0:CH=0:S=15:S0=0
10070 VALPMACTL=PEEK(559)+8+(RES*16-16)
10080 GOSUB 15000:REM SET UP PM DISPLAY
10200 RETURN
11000 REM CLEAR SCREEN SET UP BIT MAP
11005 ? "3":POKE 710,0
11010 POKE 82,25:POKE 83,26:POSITION 25,2:? "
0102030405060708091011121314151617181920";PO
KE 82,2:POKE 83,39
11020 POSITION 2,11:? "SPRITE EDITOR":? :?
"JOYSTICK CONTROLS"
11030 ? ;? "-UP CURSOR";? "-DOWN CURSOR";? "-
LEFT CURSOR";? "-RIGHT CURSOR"
11035 ? ;? "-FILL/ERASE CURSOR"
11040 ? ;? ;? "OPTION-VIEW MENU";? ;? "SEL
ECT-LIST DATA"
11050 POSITION 27,1:? "A5A3210"
11060 POKE 82,27:POKE 83,34:POSITION 27,2:? P
M:POKE 82,2:POKE 83,40
11070 RETURN
13000 REM CONVERT PM$ TO PM DATA AND POKE TO
PM TABLE
13010 FOR T=0 TO 19
13020 PMCOUNT=0:RESTORE 13100:FOR M=1 TO 8
13030 READ A:IF PM$(T*8+M,T*8+M)=" " THEN PMC
OUNT=PMCOUNT+A
13040 NEXT M
13050 PMDATA(T+1,T+1)=CHR$(PMCOUNT)
13060 NEXT T
13070 RETURN
13100 DATA 128,64,32,16,8,4,2,1
15000 REM SET UP PM DISPLAY
15005 FOR T=PMBASE*256+1512+(RES-1)*512) TO
 PMBASE*256+1640+(RES-16*(RES-1)):POKE T,0:NEXT T
15010 FOR T=1 TO 20
15020 POKE PMBASE*256+(57+(RES-1)*57)+T,A
SC(PMDATA(T,T))
15030 NEXT T
15040 POKE 54279,PMBASE:REM TELL ANTIC
15050 POKE 559,VALDMACTL:REM TELL DMACTL
15060 POKE 53277,2:REM TELL GRACTL
15070 POKE 704,COLPO:REM COLOUR
15080 POKE 53248,HPO:REM HORIZ POS.
15090 RETURN
16000 REM ERASE POINT IN PM
16010 PM$(COL-26+(ROW-2)*80),COL-26+((ROW-2)*
80+1)=" ":FOR T=1 TO 10:NEXT T:RETURN
17000 REM FILL POINT IN PM
17010 PM$(COL-26+(ROW-2)*80),COL-26+((ROW-2)*
80+1)=" ":FOR T=1 TO 10:NEXT T:RETURN
20000 REM VIEW MAIN SUB LOOP
20010 ? "3";? "VIEW OPTION";? "PRESS START TO
 RETURN TO EDITOR"
20020 ? ;? ;? "JOYSTICK CONTROLS";? ;? "-UP C
OLOUR";? "-LOWER COLOUR"
20030 ? "-SEC.LUMINANCE";? "-INC.LUMINANCE"
20040 ? ;? ;? "OPTION-SIZE";? "SELECT-RESOLUT
ION"
20050 ? ;? ;? "CURRENT COLOUR NO. ";COLPO;?
"CURRENT SIZE       ";SIZE;? "CURRENT RESOLU
TION "
20055 GOSUB 15000
20060 ST=STICK(0):IF ST=15 THEN 20200
20070 IF ST=14 THEN CL=CL+1:CL=14
20080 IF ST=13 THEN CL=CL-1:CL=1
20090 IF ST=11 THEN LM=LM+1:LM=11
20100 IF ST=7 THEN LM=LM-1:LM=14
20110 COLPO=CL*16+LM:POKE 704,COLPO
20120 POSITION 22,17:? COLPO;" "
20130 FOR T=1 TO 50:NEXT T
20140 GOTO 20060
20200 COM=PEEK(53279):IF COM=7 THEN 20060
20210 IF COM=3 THEN 20300
20220 IF SIZE=1 THEN SIZE=0:GOTO 20290
20230 IF SIZE=1 THEN SIZE=3:GOTO 20290
20240 IF SIZE=0 THEN SIZE=1:GOTO 20290
20290 POKE 53256,SIZE:POSITION 22,18:? SIZE;
 ";FOR T=1 TO 50:NEXT T:GOTO 20060
20300 IF COM=6 THEN POKE 53248,10:GOTO 60
20310 IF COM=5 THEN 20060
20320 IF RES=1 THEN RES=2:VALDMACTL=VALDMACTL
+16:GOTO 20340
20330 VALDMACTL=VALDMACTL-16:RES=1
20340 POSITION 22,19:IF RES=1 THEN ?"DOUBLE
 "
20350 IF RES=2 THEN ? "SINGLE "
20360 GOSUB 15000:GOTO 20060
```

1st London MicroMarket

BARGAINS GALORE

WEMBLEY CONFERENCE CENTRE NOV. 10TH & 11TH

Here's your chance to sweep up all your Microcomputer needs before Christmas, at London's first ever Micro Market.

- ★ Thousands of Hardware & Software Bargains!
- ★ Competitions and Prizes
- ★ Win a Personal Computer!
- ★ Bring & Buy Swap Shop!
- ★ Free Computer advice at our Computer Surgery

All leading makes of Micro including:

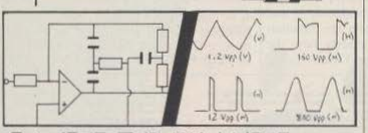
- ★ BBC
- ★ Commodore
- ★ Apple
- ★ Spectrum
- ★ QL
- ★ Oric
- ★ Printers
- ★ Peripherals
- ★ Joy Sticks
- ★ DIY Robots
- ★ Modems

OPEN 10am-6pm Sat. November 10th
10am-4pm Sun. November 11th
Adults £1.50 Under 14's 75p.
Including **FREE SHOW GUIDE**

MICROCOMPUTER BARGAINS GALORE, LOWEST PRICES IN TOWN, DON'T MISS IT!!!

Spectre

ENFIELD HOUSE
SWARDESTON
NORWICH
NORFOLK



ELECTRONICS

£ 9.95

DIGITAL CIRCUIT DESIGNER. Electronics allows you to draw your circuit diagram on screen using standard symbols for logic gates, transistors, resistors, capacitors, diode, telacs, diodes, etc, etc... Symbols can be rotated, wiring interconnected or crossed over as required. Once complete the computer will 'power up' your circuit - high voltage levels turn red, low levels turn green. Circuits can be de-activated, modified and re-activated until they function as required, all without touching a soldering iron! Part completed circuits may be saved for future work and displays can be sent to the printer. All components are fully interactive i.e. they can change the state of sections previously activated in the sequence - even oscillators can be seen oscillating. Warning is given of short-circuits. (57 defined graphics are employed)

LINNET

£ 14.95

LINEAR NETWORK ANALYSER. Characteristics of complete networks, including sub-circuits, are entered. The computer performs either time or frequency domain analysis, presenting the output data in any of a choice of forms, both graphical and written. The program detects the presence of a printer and, if connected, can produce detailed graphical displays by printing lengthways along the paper. Happily deals with highly complex networks - the instruction book provides numerous examples using transistors, I.C.s, bandpass filters, op amps, etc, etc... An invaluable tool for both professional and amateur designers.

48 K SPECTRUM

DOT MATRIX

Epson RX80
£219 inc VAT

Epson RX80 F/T
£255 inc VAT

Epson RX80	£190.43 + VAT £219
Epson RX80 F/T	£221.74 + VAT £255
Epson FX80	£329.57 + VAT £379
Epson FX100	£511.30 + VAT £588
KDC FT-5001	£203.48 + VAT £234
Mannesmann Tally MT80	£195.65 + VAT £225
Canon PW 1080A	£277.39 + VAT £319
Star Delta 10	£317.39 + VAT £365
(with Serial/Parallel 1F 8K Buffer)	
RS232 Interfaces from	£26.09 + VAT £30
Printer Cables	£10.43 + VAT £12

colour MONITORS

MicroVitec 1451/QL
£255 inc. VAT

Amstrad CTM640	£146.96 + VAT £169
Microvitec 1431	£169.57 + VAT £195
1431 (RGB/PAL/AUDIO)	£195.65 + VAT £225
Kaga Vision EX	£186.96 + VAT £215
JVC 1302-1 (QL/BBC)	£169.57 + VAT £195
Microvitec 1451/QL	£221.74 + VAT £255
Microvitec 1451	£239.14 + VAT £275
1451 (RGB/PAL/AUDIO)	£295.65 + VAT £340
Kaga Vision II	£234.78 + VAT £270
JVC 1302-2 (QL/BBC)	£220.00 + VAT £253
Microvitec 1441	£433.91 + VAT £499
Kaga Vision III	£321.74 + VAT £370

DAISYWHEEL

JUKI 6100
£375 inc VAT

JUKI 6100	£326.09 + VAT £375
Daisy Step 2000	£216.52 + VAT £249

mono MONITORS

Amstrad GT64	£60.00 + VAT £69
Sanyo DM2112 (15 MHz)	£65.22 + VAT £75
Sanyo DM8112CX (18 MHz)	£89.57 + VAT £99
ISL 18 (18 MHz)	£53.91 + VAT £62
ISL 20 (swivel 80 col)	£63.48 + VAT £73
Teco with Zoom	£91.30 + VAT £105

PROCESSORS

BBC Model B	£320.87 + VAT £369*
BBC B with DFS	£399.13 + VAT £459
Amstrad CPC464	£139.13 + VAT £160
6v power + UHF	£24.35 + VAT £28
ISL 8083 (IBM Comp)	£1173.91 + VAT £1350
DEC 11/23 40 MB	£6086.96 + VAT £7000
DEC 11/73 170 MB	£10434.78 + VAT £12000

PHONE FOR QUOTATION ON BESPOKE ACCOUNTING SOFTWARE INVOICING/LEDGERS/PAYROLL

*While stocks last

micro FAST
THE EXPERTS

Prices shown are for cash & carry sales and are correct at time of going to press in September

To help you create hand-crafted machine code for the QL Philip Holliday delves deep into the machine.

DISASSEMBLER

The QL Disassembler.

```
10 REMark Copyright P.A.Holliday 1984
100 MODE 4:CSIZE 1,0:CLS
110 INPUT("Start address?") !
first$:first=2*INT(convert(first$)/2)
120 INPUT("End address?") ! last$:last=convert(last$)
130 INPUT("output device?") ! o$
140 IF o$="" THEN o$="con_448x200a32x16_128"
150 OPEN#15,o$
160 INPUT("Name of file of data areas?") ! f$
170 IF f$<>"" THEN
180   OPEN_IN#14,f$:get_t
190 ELSE
200   t1=last+2:t2=t1
210 END IF
220 IF o$(1 TO 3)=="con" OR o$(1 TO 3)=="scr" THEN
CLS#15
230 address=first
240 REPeat loop
250   IF address>last THEN EXIT loop
260   IF address=t2 THEN get_t
270   IF address >= t1 THEN
275   diss_data
280   ELSE
285   diss
290   END IF
295   address=address+2
300 END REPeat loop
310 CLOSE#15:STOP
1000 DEFine PROCedure diss
```

(listing continued on next page)

FINALLY THE QL arrived. The first task seemed to be to write a disassembler so that I could both delve into the inner workings of the machine and crack some of the QDOS operating system calls, and also check hand-assembled machine-code programs entered as data for correctness by disassembling the result. There is as yet no assembler available. The result is presented here.

Next month I will present the first of a three-part series on 68000 machine code.

The 68008 instruction set is extremely regular, making the job of writing the disassembler a relatively straightforward one, both from the point of view of length of the resulting program and also from the time taken to test it. In fact the disassembler consists in the main of select statements — SuperBasic equivalent of the case or switch construct available in most structured languages — which breaks the opcode down until the actual instruction has been found, together with a set of functions which enable the whole of the instruction to be synthesised from the code.

Motorola mnemonics have been used throughout. A # character preceding a number indicates that it is immediate data; a $ prefixing a number indicates that hex notation is being used. This disassembler presents all numbers in hex. A suffix of .B , .W or .L indicates that the instruction operates on byte

(continued on next page)

68000 QL QL

(continued from previous page)

— 8 bits; word — 16 bits — or long word — 32 bits of data respectively.

After entering and saving the program it can be run. It prompts for the start and end addresses of the section of code to be disassembled. These addresses can be entered in decimal, or in hex by prefixing the response with a $. The letters A to F can be entered in upper or lower case.

Try a start address of $168 which is where the QL initially starts execution. It will then prompt for the output device. Just hit Enter for output to the console or else the output device name, i.e., SER1 for output to a printer if you have one. The last prompt is for the name of a Microdrive file which contains pairs of addresses of start and end of blocks of text or data which should not be disassembled as instructions.

This file can be generated simply by opening it and printing addresses to it, and then closing it again. Alternatively you can use Quill to edit the contents of this file. However certain points must be borne in mind. There must be no empty lines, no header or footer and only one entry per line.

The file must be generated by using the Quill Print command, and the installed print driver should not generate any preamble code. If you do not wish to specify a file containing text and data addresses hit Enter.

The assembly listing produced is in four fields. The address field — 5 bytes — and opcode field — 2 to 10 bytes — are both displayed in hex but without a $ prefix. The instruction itself is next, followed by an error message which is given if an illegal or unimplemented instruction is found. Note that the error-checking in this disassembler is by no means exhaustive.

For those of you who do not have the energy to type out the program the author is prepared to copy it onto your supplied Microdrive cartridge. Please state whether the cartridge is formatted or not and include £2.00 to cover postage, packing and time. Send it to Philip Holliday, 44 Lennard Road, London SE20 7LX.

(listing continued from previous page)

```
1010   instr=PEEK_W(address):IF instr<0 THEN
instr=instr+65536
1020
addr$=address$(address):obj$=word$(instr):er$=""
1030   instr_type=INT(instr/4096):LET
opfield=instr-instr_type*4096
1040   SELect ON instr_type
1050      =0:op$=bit_man$
1060      =1:op$=move$(0)
1070      =2:op$=move$(2)
1080      =3:op$=move$(1)
1090      =4:op$=misc$
1100      =5:op$=add_sub$
1110      =6:op$=branch$
1120      =7:op$=moveq$
1130      =8:op$=or_div$
1140      =9:op$=sub_subx$
1150      =11:op$=cmp_eor$
1160      =12:op$=and_mul$
1170      =13:op$=add_addx$
1180      =14:op$=shift_rot$
1190      =REMAINDER :op$="":er$=er$ & "unassigned op
code"
1200    END SELect
1210    PRINT#15,addr$ ! obj$ TO 27; op$ ! er$
1220 END DEFine diss
5000 DEFine FuNction hex$(a)
5010   RETurn CHR$(a+48+7*(a>9))
5020 END DEFine hex$
5030 DEFine FuNction address$(x)
5040   LOCal y
5050   y=INT(x/65536)
5060   RETurn hex$(y) & word$(x-65536*y)
5070 END DEFine address$
5080 DEFine FuNction word$(x)
5090   LOCal y,z
5100   z=x
5110   IF z<0 THEN z=z+65536
5120   y=INT(z/256)
5130   RETurn byte$(y) & byte$(z-256*y)
5140 END DEFine word$
5150 DEFine FuNction byte$(x)
5160   LOCal x%
5170   x%=x-256*INT(x/256)
5180   RETurn hex$(x% DIV 16) & hex$(x% MOD 16)
5190 END DEFine byte$
5200 DEFine FuNction eff_addr$(eff_mod,reg,size)
5210   LOCal x
5220   SELect ON eff_mod
5230     =0:RETurn "D" & reg
5240     =1:RETurn "A" & reg
5250     =2:RETurn "(A" & reg & ")"
5260     =3:RETurn "(A" & reg & ")+"
5270     =4:RETurn "-(A" & reg & ")"
5280     =5:RETurn "$" & s_word$(advance) & "(A" & reg
& ")"
5290     =6:x=advance
5300     IF x < 0 THEN
5310     d_a$ = "A"
5320     ELSE
5330     d_a$ = "D"
5340     END IF
5350     IF x && 2048
5360     w_l$ = ".L"
5370     ELSE
5380     w_l$ = ".W"
5390     END IF
5400     RETurn "$" & s_byte$(x) & "(A" & reg & ", " &
d_a$ & (INT(x/4096) MOD 8) & w_l$ & ")"
5410     =7:SELect ON reg
5420       =0:RETurn "$" & word$(advance)
5430       =1:RETurn "$" & word$(advance) &
word$(advance)
5440       =2:x=advance:RETurn "$" &
address$(address+x)
5450       =3:x=advance
5460       IF x<0
5470       d_a$ = "A"
5480       ELSE
5490       d_a$ = "D"
5500       END IF
5510       IF x && 2048
5520       w_l$ = ".L"
5530       ELSE
5540       w_l$ = ".W"
5550       END IF
5560       RETurn "$" & s_byte$(x) &"(PC," & d_a$ &
(INT(x/4096) MOD  8)& w_l$ & ")"
5570         =4:RETurn immediate$(size)
5580       = REMAINDER :er$=er$ & "eff addr
error":RETurn ""
5590     END SELect
5600   END SELect
5610 END DEFine eff_addr$
5620 DEFine FuNction source_ea$(size)
5630   LOCal x,y
5640   x=opfield DIV 8 MOD 8:y=opfield MOD 8
5650   RETurn eff_addr$(x,y,size)
5660 END DEFine source_ea$
5670 DEFine FuNction dest_ea$(size)
5680   LOCal x,y
5690   x=opfield DIV 64 MOD 8:y=opfield DIV 512
5700   RETurn eff_addr$(x,y,size)
5710 END DEFine dest_ea$
5720 DEFine FuNction size$
5730   LOCal x
5740   x = opfield DIV 64 MOD 4
5750   SELect ON x
5760     =0:RETurn ".B"
5770     =1:RETurn ".W"
5780     =2:RETurn ".L"
5790     =REMAINDER :er$=er$ & "error in size
field":RETurn ""
5800   END SELect
5810 END DEFine size$
5820 DEFine FuNction condition$
5830   LOCal x
5840   x=opfield DIV 256 MOD 16
5850   SELect ON x
5860     =0:RETurn "T"
5870     =1:RETurn "F"
5880     =2:RETurn "HI"
5890     =3:RETurn "LS"
5900     =4:RETurn "CC"
5910     =5:RETurn "CS"
5920     =6:RETurn "NE"
5930     =7:RETurn "EQ"
5940     =8:RETurn "VC"
5950     =9:RETurn "VS"
5960     =10:RETurn "PL"
```

(continued on page 136)

What the competition hasn't been waiting for.

Latest version of Forth for the BBC (Is not rehashed Forth 79 Code)

Unique Stack Display Utility

16k Eprom type 27128

Multi-tasking operating system for Real-Time use.

Here's the Forth Eprom for the BBC Micro that makes all others out of date.

It's Multi-Forth 83 from David Husband who has built his reputation for Quality Forth products with his ZX81-Forth ROM, Spectrum Forth-I/O Cartridge and now New Multi-Forth 83 for the BBC Micro. This is not rehashed Forth 79 Code, but a completely new version of the Forth 83 Standard. It's unique in that it Multi-tasks, and therefore the user can have a number of Forth programs executing simultaneously and transparently of each other.

Multi-Forth 83 sits in the sideways ROM area of the BBC along with any other ROMs in use. It is compatible with the MOS, and specially vectored to enable a system to be reconfigured. It contains a Standard 6502 Assembler, a Standard Screen Editor, and a Unique Stack Display Utility.

With this Forth, David Husband has provided the BBC Micro with capabilities never before realised. And being 16K rather than 8K is twice the size of other versions. Multi-Forth 83 is supplied with an extensive Manual (170 pages plus) and at £45+VAT it is superb value.

Order it using the coupon adding £2.30 p&p (£5 for Europe, £10 outside) or if you want more information, tick that box instead. Either way, it will put you one step ahead of the competition.

Please send me Multi-Forth 83 for BBC Micro. £45+VAT. De-luxe System inc. Disc £80+VAT. Cheques to Skywave Software Readers' A/C (or enter Visa No.)

Name_____

Address_____

Post code_____

SUBJECT TO AVAILABILITY. FOR I/O S ONWARDS.
Send to Skywave Software, 73 Curzon Road, Bournemouth, BH1 4PW, Dorset, England. Tel: (0202) 302385

Please send me more information:
- ☐ Multi-Forth 83
- ☐ ZX81-Forth ROM
- ☐ Spectrum Forth I/O Cartridge

Skywave SOFTWARE

MULTI-FORTH 83 FOR THE BBC MICRO

IT TRANSFORMS THE HOME COMPUTER OUT OF ALL RECOGNITION

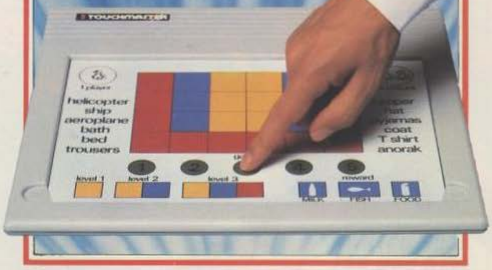
Because Touchmaster is a touch sensitive surface which effectively bypasses the keyboard, it has none of the keyboard's complications, typing skill requirements or potential errors.

To operate Touchmaster, you simply slide an overlay onto its surface, load the matching Touchware into your computer and touch the overlay.

For repeatability and resolution, no other ostensibly comparable pads can touch Touchmaster.

In fact, Touchmaster's unique technology makes it state of the art when it comes to such pads.

Other pads might fairly be described as peripherals. Touchmaster goes a lot further: it respecifies the home computer.



Now anyone can master the home computer

TOUCHMASTER

For full details, contact **Touchmaster Limited, PO Box 3, Port Talbot, West Glamorgan SA13 1WH,** or phone **Teledata (01) 200 0200**

(continued from page 134)

```
5970    =11:RETURN "MI"
5980    =12:RETURN "GE"
5990    =13:RETURN "LT"
6000    =14:RETURN "GT"
6010    =15:RETURN "LE"
6020  END SELect
6030 END DEFine condition$
6040 DEFine FUNCTION disp1$
6050   LOCAL x
6060   y=opfield MOD 256
6070   IF x<>0 THEN
6080     IF y>127 THEN LET x=x-256
6090     RETURN "#" & address$(address + x + 2)
6100   ELSE
6110     x=advance
6120     RETURN "#" & address$(address + x)
6130   END IF
6140 END DEFine disp1$
6150 DEFine FUNCTION dat$
6160   LOCAL x
6170   x=opfield DIV 512
6180   IF x=0 THEN x=8
6190   RETURN "#" & x
6200 END DEFine dat$
6210 DEFine FUNCTION disp16$
6220   RETURN "#" & address$(address, + advance)
6230 END DEFine disp16$
6240 DEFine FUNCTION immediate$(size)
6250   LOCAL x,y
6260   x=advance
6270   SELect ON size
6280     ON size=0
6290       x=x MOD 256
6300       IF x < 128 THEN
6310         RETURN "#$" & byte$(x)
6320         ELSE RETURN "#$-" & byte$(256-x)
6330     END IF
6340     ON size=1
6350     IF x<>0 THEN
6360       RETURN "#$" & word$(x)
6370     ELSE
6380       RETURN "#$0-" & word$(2^16-x)
6390     END IF
6400     ON size=2
6410       y=advance
6420       IF x<>0 THEN
6430         IF y<0 THEN y=2^16+y
6440         x=2^16-(x + NOT y)
6450         RETURN "#$-" & word$(x) & word$(y)
6460         ELSE
6470         RETURN "#$" & word$(x) & word$(y)
6480       END IF
6490     =REMAINDER jerr$=#$ & "size field
error"!RETURN ""
6500   END SELect
6510 END DEFine immed$(size)
6520 DEFine FUNCTION type$
6530   LOCAL x
6540   x=opfield DIV 64 MOD 4
6550   SELect ON x
6560     =0:RETURN "TST"
6570     =1:RETURN "CMP"
6580     =2:RETURN "CLR"
6590     =3:RETURN "SET"
6600   END SELect
6610 END DEFine type$
6620 DEFine FUNCTION sz$
6630   IF opfield MOD 64 THEN RETURN ".L"
6640   ELSE RETURN ".W"
6650 END IF
6660 END DEFine sz$
6670 DEFine FUNCTION advance
6680   LOCAL x
6690   address$=address$(2)&FEED_WHADDRESS(rdb$&rdb$ & "
word$(x)
6700   RETURN x
6710 END DEFine advance
6720 DEFine FUNCTION direction$
6730   IF opfield MOD 256
6740   RETURN "L"
6750   ELSE
6760   RETURN "R"
6770   END IF
6780 END DEFine direction$
6790 DEFine FUNCTION shift$
6800   LOCAL x
6810   x=opfield DIV 512 MOD 4
6820   SELect ON x
6830     =0:RETURN "AS"
6840     =1:RETURN "LS"
6850     =2:RETURN "ROX"
6860     =3:RETURN "RO"
6870   END SELect
6880 END DEFine shift$
6890 DEFine FUNCTION convert$(string*)
6900   LOCAL x,y,z,base
6910 - IF string$(1) = "$"
6920   base=16
6930   ELSE
6940   base=LEN(string$)-2 TO 1
6950   x=0
6970   FOR y=1 TO LEN(string$)
6980     z=CODE(string$(y))
6990     SELect ON z
7000       =48 TO 57:z=z-48
7010       =65 TO 70:z=z-55
7020       =97 TO 102:z=z-87
7030     =REMAINDER !PRINT "not acceptable number"
7040   END SELect
7050   x= x * base + z
7060   END FOR y
7070   RETURN x
7080 END DEFine convert$
7090 DEFine PROCEdure disp_data
7100   word=FEED_WHADDRESS(
7110 PRINTS(address$&address$ & " word$word)
7120 END DEFine disp_data
7130 DEFine PROCEdure get_t
7140   IF NOT EOF(#1)#
7150   INPUT #1,t$
7160   ELSE
7170   t=t$(t)
7180   END IF
7190   IF NOT EOF(#1)#
7200   INPUT #1,t$
7210   ELSE
7220   t=t$(t)
7230   END IF
7240 t=t$(t)+CHR$(2)+CHR$(2)
7250 END DEFine get_t
7260 DEFine FUNCTION b_word(x)
7270   LOCAL y
7280   IF x<0
7290     y=2^16+x
7300     RETURN "=" & word$(y)
7310   ELSE
7320     RETURN word$(x)
7330   END IF
7340 END DEFine w_word$
7350 DEFine FUNCTION b_byte$(x)
7360   LOCAL y
7370   y= x& 255
7380   IF y>127
7390     RETURN "=" & byte$(256-y)
7400   ELSE
7410     RETURN byte$(y)
7420   END IF
7430 END DEFine b_byte$
7440 DEFine FUNCTION multiple$
7450   LOCAL a$,x,x,y
7460   x=advance
7470   a$= "!13#0
7480   IF opfield<=2240 AND opfield<=2247 THEN
x=reverse(x)
7490   IF x<0 THEN x=x+2^16
7500     FOR i = 0 TO 15
7510       y=x/4-INT(x/4)*4
7520       SELect ON y
7530         =1:a$=a$ & CHR$(48-INT( DIV 8)) & (1 MOD 8)
7540         =2:IF a$!" " THEN a$=a$ & "/"
7550         =3:IF a$!LEN(a$)!" " THEN a$=a$ &
CHR$(48-INT( DIV 8)) & (1 MOD 8) & "-"
7560       END SELect
7570       =INT(x/2)
7580       END FOR i
7590       RETURN a$
7600 END DEFine multiple$
7610 DEFine FUNCTION reverse(x)
7620   LOCAL i,y,z
7630   y=0
7640   IF x<0 THEN x=x+2^16
7650   FOR i =0 TO 15
7660     z=INT(x)/2
7670     y=y+z-INT(z)*2^(16-i)
7680     x=INT(z)
7690   IF x=0 AND x<15 THEN x=x-2^16
7700   RETURN y
7710 END DEFine reverse
10000 DEFine FUNCTION move$(size)
10010 LOCAL a$
10020 a$="DUMMY":IF opfield DIV 64 MOD 8=1 THEN
a$="MOVEM"
10030   SELect ON size
10040     =0:RETURN a$ & ".B " & source_ea$(size) &
"," & dest_ea$(size)
10050     =1:RETURN a$ & ".W " & source_ea$(size) &
"," & dest_ea$(size)
10060     =2:RETURN a$ & ".L " & source_ea$(size) &
"," & dest_ea$(size)
10070   END SELect
10080 END DEFine move$
10090 DEFine FUNCTION branch$
10100   LOCAL x
10110   x=opfield DIV 256
10120   SELect ON x
10130     =0:RETURN "BRA " & disp$
10140     =1:RETURN "BSR " & disp$
10150     =REMAINDER !RETURN "B" & conditions & " " &
disp$
10160   END SELect
10170 END DEFine branch$
10180 DEFine FUNCTION add_sub$
10190   LOCAL x,size
10200   x=opfield DIV 64 MOD 4
10210   x=opfield DIV 8 MOD 64
10220   SELect ON x
10230     =0 TO 2:RETURN "ADDQ" & size$ & " " & dat$
& "," & source_ea$(size)
10240     =32 TO 55:RETURN "SUBQ" & size$ & " " & dat$
& "," & source_ea$(size)
10250     =25,57:RETURN "DB" & conditions & " " & "D"
& (opfield MOD 8) & "," & disp16$
10260     =REMAINDER !RETURN "B" & conditions & " " &
disp16$
10270   END SELect
10280 END DEFine add_sub$
10290 DEFine FUNCTION movep$
10300   RETURN "MOVEP #" & a_byte$(opfield MOD 256) &
",D" & (opfield DIV 512)
10310 END DEFine movep$
10320 DEFine FUNCTION bit_num$
10330   LOCAL x,y,size
10340   x=opfield DIV 256
10350   y=(opfield DIV 64 MOD 4
10360   SELect ON x
10370     =0:RETURN "ORI" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10380     =2:RETURN "ANDI" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10390     =4:RETURN "SUBI" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10400     =6:RETURN "ADDI" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10410     =10:RETURN "EORI" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10420     =12:RETURN "CMPI" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10430     =8:RETURN "BTST" & size$ & " " &
immediate$(size) & ",#" & source_ea$(size)
10440     =REMAINDER !opfield DIV 8 MOD 8
10450     SELect ON y
10460       =1:RETURN movep$
10470       =REMAINDER !RETURN "B" & type$ & " " & "D"
& (opfield DIV 512) MOD 8) & ",#" & source_ea$(size)
10480     END SELect
10490   END SELect
10500 END DEFine bit_num$
10510 DEFine FUNCTION move$
10520   LOCAL x
10530   x=opfield DIV 64 MOD 8
10540   SELect ON x
10550     =1:RETURN "MOVEP.W " & disp16$ & "(A" &
(opfield MOD 8) & ")" & ",D" & (opfield DIV 512)
10560     =REMAINDER !RETURN "MOVEP.L " & disp16$ &
(opfield MOD 8) & ")" & ",D" & (opfield DIV 512)
10570     =6:RETURN "MOVEP.W " & "D" & (opfield DIV
512) & "," & disp16$ & "(A" & (opfield MOD 8) & ")"
10580     =7:RETURN "MOVEP.L " & "D" & (opfield DIV
512) & "," & disp16$ & "(A" & (opfield MOD 8) & ")"
10590   END SELect
10600 END DEFine move$
10610 DEFine FUNCTION misc$
10620   LOCAL x,size,y$
10630   x=opfield DIV 64 MOD 4
10640   SELect ON opfield
10650     =0:RETURN "NEGX" & size$ & " " &
source_ea$(size)
10660     =1:RETURN "MOVE SR," &
source_ea$(1)
10670     =512 TO 703:RETURN "CLR" & size$ & " " &
source_ea$(size)
10680     =1024 TO 1215:RETURN "NEG" & size$ & " " &
source_ea$(size)
10690     =1216 TO 1279:RETURN "MOVE.W " &
source_ea$(1) & ",SR"
10700     =1536 TO 1727:RETURN "NOT" & size$ & " " &
source_ea$(size)
10710     =1728 TO 1791:RETURN "MOVE.W " &
source_ea$(1) & ",SR"
10720     =2048 TO 2111:RETURN "NBCD.B " &
source_ea$(0)
10730     =2112 TO 2119:RETURN "SWAP D" & (opfield MOD
8)
10740     =2120 TO 2175:RETURN "PEA.L " &
source_ea$(2)
10750     =2176 TO 2183:RETURN "EXT.W D" & (opfield
MOD 8)
10760     =2184 TO 2239:2248 TO 2303:RETURN "MOVEM" &
sz$ & " " & multiple$ & "," & source_ea$(size-1)
10770     =2240 TO 2247:RETURN "EXT.L D" & (opfield
MOD 8)
10780     =2560 TO 2751:RETURN "TST" & size$ & " " &
source_ea$(size)
10790     =2752 TO 2815:RETURN "TAS.B " &
source_ea$(0)
10800     =3200 TO 3327:t$=multiple$:RETURN "MOVEM" &
sz$ & " " & source_ea$(size-1) & "," & t$
10810     =3648 TO 3663:RETURN "TRAP #" & byte$(
opfield MOD 16)
10820     =3664 TO 3671:RETURN "LINK A" & (opfield MOD
8) & ",#" & w_word$(advance)
10830     =3672 TO 3679:RETURN "UNLK A" & (opfield MOD
8)
10840     =3680 TO 3687:RETURN "MOVE USP,A" &
(opfield MOD 8)
10850     =3688 TO 3695:RETURN "MOVE A" & (opfield MOD
8) & ",USP"
10860     =3696:RETURN "RESET"
10870     =3697:RETURN "NOP"
10880     =3698:RETURN "STOP" & immediate$(1)
10890     =3699:RETURN "RTE"
10900     =3701:RETURN "RTS"
10910     =3702:RETURN "TRAPV"
10920     =3703:RETURN "RTR"
10930     =3712 TO 3775:RETURN "JSR " & source_ea$(1)
10940     =3776 TO 3839:RETURN "JMP " & source_ea$(1)
10950     =REMAINDER !opfield DIV 64 MOD 8
10960   SELect ON x
10970     =6:RETURN "CHK " & source_ea$(1) & ",D" &
(opfield DIV 512)
10980     =7:RETURN "LEA " & source_ea$(2) & ",A" &
(opfield DIV 512)
10990     =REMAINDER jerr$=#$ & "error in misc
group"!RETURN ""
11000   END SELect
11010   END SELect
11020 END DEFine misc$
11030 DEFine FUNCTION sub_sub$
11040   RETURN "SUB" & con_add_sub$
11050 END DEFine sub_sub$
11060 DEFine FUNCTION add_add$
11070   RETURN "ADD" & con_add_sub$
11080 END DEFine add_add$
11090 DEFine FUNCTION con_add_sub$
11100   LOCAL x,y,size
11110   x=opfield DIV 8 MOD 64
11120   size=opfield DIV 64 MOD 4
11130   SELect ON x
11140     =32,40,48:RETURN "X" & size$ & " " & "D" &
(opfield MOD 8) & ",D" & (opfield DIV 512)
11150     =33,41,49:RETURN "X" & size$ & " " & "-(A" &
(opfield MOD 8) & ")" & ",-(A" & (opfield DIV 512) &
")"
11160     =REMAINDER !y=opfield DIV 64 MOD 8
11170     SELect ON y
11180       =0 TO 2:RETURN " " & source_ea$(size) &
",D" & (opfield DIV 512)
11190       =3:RETURN "A.W " & source_ea$(1) & ",A" &
(opfield DIV 512)
11200       =4 TO 6:RETURN " D" & (opfield DIV 512) &
"," & source_ea$(size)
11210       =7:RETURN "A.L " & source_ea$(2) & ",A" &
(opfield DIV 512)
11220     END SELect
11230   END SELect
11240 END DEFine con_add_sub$
11250 DEFine FUNCTION cmp_eor$
11260   LOCAL x,y,size
11270   x=opfield DIV 64 MOD 8size=x MOD 4
11280   SELect ON x
11290     =0 TO 2:RETURN "CMP" & size$ & " " &
source_ea$(size) & ",D" & (opfield DIV 512)
11300     =3:RETURN "CMPA.W " & source_ea$(1) & ",A" &
(opfield DIV 512)
11310     =7:RETURN "CMPA.L " & source_ea$(2) & ",A" &
(opfield DIV 512)
11320     =REMAINDER !y=opfield DIV 8 MOD 64
11330   SELect ON y
11340     =33,41,49:RETURN "CMPM" & size$ & " " &
(opfield MOD 8) & "+(A" & (opfield DIV 512) & ")+"
11350     =REMAINDER !RETURN "EOR" & size$ & " " &
(opfield DIV 512) & ",D" & source_ea$(size)
11360   END SELect
11370 END DEFine
11380 DEFine FUNCTION cmp_eor$
11390 DEFine FUNCTION shift_rot$
11400   LOCAL x,y,z
11410   x=opfield DIV 64 MOD 4
11420   SELect ON x
11430     =3:RETURN shift$ & direction$ & size$ & " "
& source_ea$(1)
11440     =REMAINDER !y=opfield DIV 32 MOD 2
11450       SELect ON y
11460         =0:z=opfield DIV 512:IF z=0 THEN LET z=8
11470         RETURN shift$ & direction$ & size$ & " #"
& z & ",D" & (opfield MOD 8)
11480         =1:z=opfield DIV 512
11490         RETURN shift$ & direction$ & size$ & " D"
& z & ",D" & (opfield MOD 8)
11500       END SELect
11510   END SELect
11520 END DEFine shift_rot$
11530 DEFine FUNCTION or_div$
11540   LOCAL x,y,size
11550   x=opfield DIV 64 MOD 8
11560   SELect ON x
11570     =3:RETURN "DIVU" & source_ea$(1) & ",D" &
(opfield DIV 512)
11580     =7:RETURN "DIVS" & source_ea$(1) & ",D" &
(opfield DIV 512)
11590     =REMAINDER !y=opfield DIV 8 MOD 64size=x
MOD 4
11600     SELect ON y
11610       =0 TO 2:RETURN "OR" & size$ & " " &
source_ea$(size) & ",D" & (opfield DIV 512)
11620       =4:RETURN "SBCD -(A" & (opfield MOD 8) &
",-(A" & (opfield DIV 512) & ")"
11630       =5:RETURN "OR" & size$ & " D" &
(opfield DIV 512) & ",-" & source_ea$(size)
11640       =REMAINDER !RETURN "OR" & size$ & " D" &
(opfield DIV 512) & ",-" & source_ea$(size)
11650     END SELect
11660   END SELect
11670 END DEFine or_div$
11680 DEFine FUNCTION and_mul$
11690   LOCAL x,y,size
11700   x=opfield DIV 64 MOD 8
11710   SELect ON x
11720     =3:RETURN "MULU " & source_ea$(1) & ",D" &
(opfield DIV 512)
11730     =7:RETURN "MULS " & source_ea$(1) & ",D" &
(opfield DIV 512)
11740     =REMAINDER !y=opfield DIV 8 MOD 64size=x
MOD 4
11750       SELect ON y
11760         =0 TO 2:RETURN "AND" & size$ & " " &
source_ea$(size) & ",D" & (opfield DIV 512)
11770         =4:RETURN "ABCD D" & (opfield MOD 8) &
",D" & (opfield DIV 512)
11780         =5:RETURN "ABCD -(A" & (opfield MOD 8) &
",-(A" & (opfield DIV 512) & ")"
11790         =6:RETURN "EXG D" & (opfield DIV 512) &
",D" & (opfield MOD 8)
11800         =9:RETURN "EXG A" & (opfield DIV 512) &
",A" & (opfield MOD 8)
11810         =9:RETURN "EXG D" & (opfield DIV 512) &
",A" & (opfield MOD 8)
11820         =REMAINDER !RETURN "AND" & size$ & " D" &
(opfield DIV 512) & ",-" & source_ea$(size)
11830       END SELect
11840     END SELect
11850 END DEFine and_mul$
```

MICROPOWERMICROPOWERMICROPOWERMICROPOWER

SUPER-FAST LOADING TIME

commodore 64 electron

B.B.C. MICRO

BUMBLE BEE

A FANTASTIC NEW PROGRAM
FROM BRITAIN'S LEADING SOFTWARE HOUSE!

Fly the bee around the grid avoiding the toadstools. Spin the turnstiles to evade the spiders, or coax them into the fireballs. Collect all the pollen to slide back the exit doors to advance to the next insect ridden level.

£6.95 (BBC version £7.95)

Commodore Disk price £9.95

COMMODORE 64 VERSION

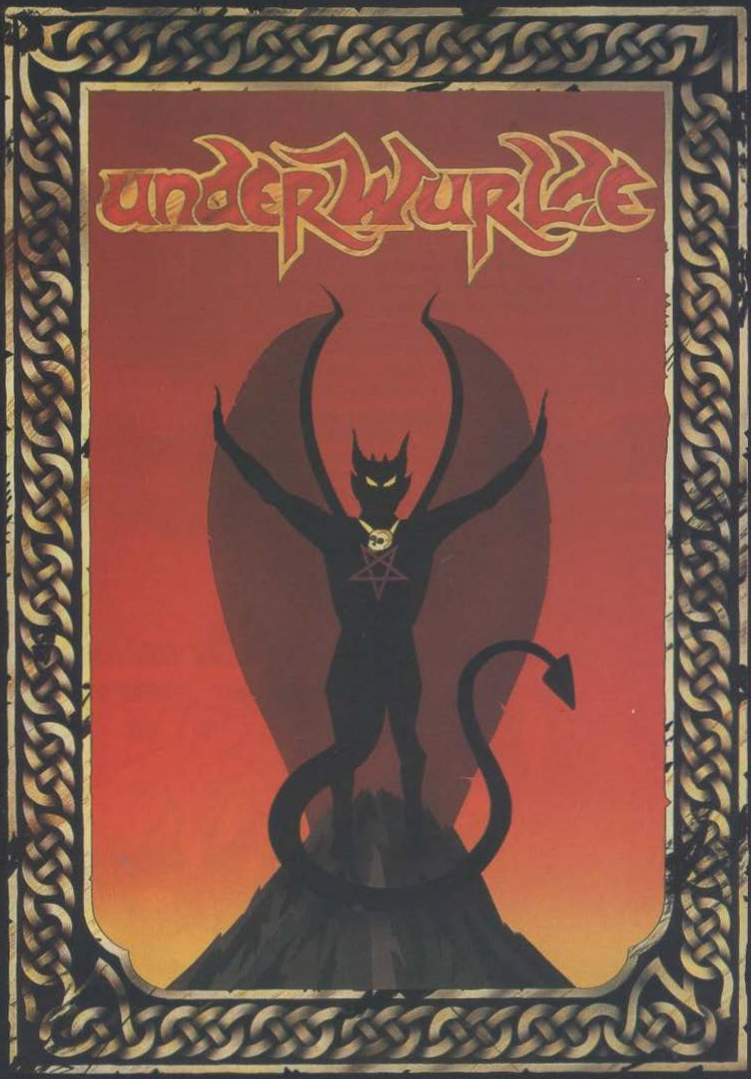
WATCH OUT FOR OUR NEW PACKAGING AND CATALOGUE

MICRO POWER

MICRO POWER LTD.,
NORTHWOOD HOUSE, NORTH STREET,
LEEDS LS7 2AA TEL. (0532) 458800
SELECTIVE BRANCHES OF BOOTS, CO-OP, MENZIES, W. H. SMITH, WOOLWORTHS AND ALL GOOD DEALERS

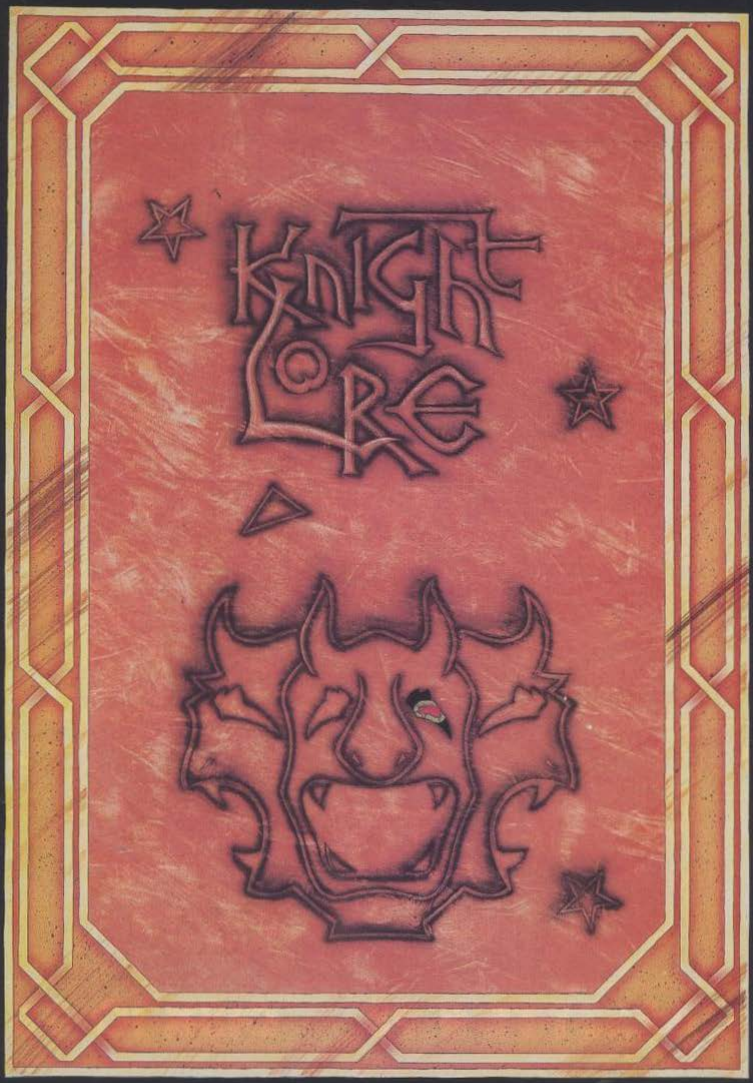
AUTHORS! WE PAY 20% ROYALTIES!

48K SINCLAIR ZX SPECTRUM



"UNDERWURLDE" recommended retail price £9.95 inc VAT
Available from W.H.SMITHS, BOOTS, J.MENZIES, WOOLWORTHS
and all good software retail outlets. Also available from
ULTIMATE PLAY THE GAME, The Green, Ashby-de-la-Zouch, Leicestershire LE6 5JU
(P&P included) Tel: 0530 411485

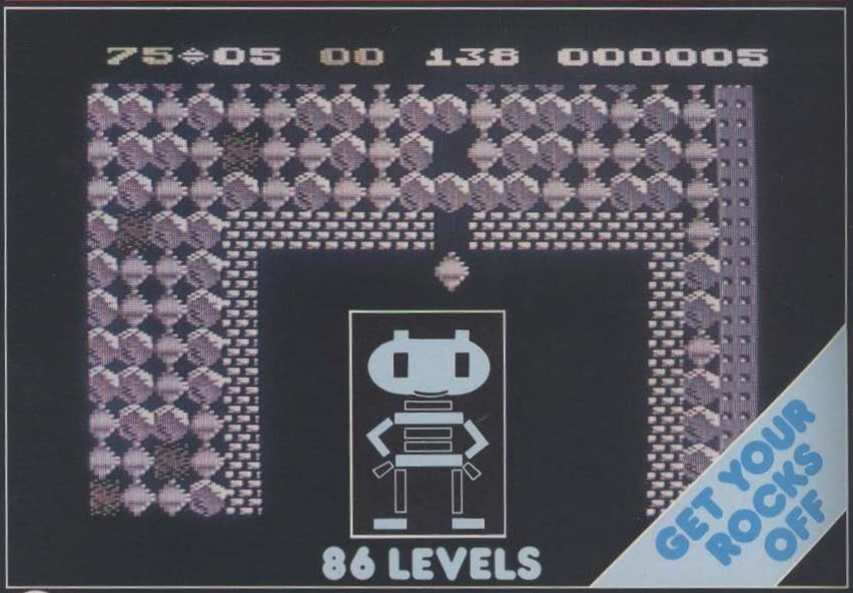
48K SINCLAIR ZX SPECTRUM



"KNIGHT LORE" recommended retail price £9.95 inc VAT
Available from W.H.SMITHS, BOOTS, J.MENZIES, WOOLWORTHS
and all good software retail outlets. Also available from
ULTIMATE PLAY THE GAME, The Green, Ashby-de-la-Zouch, Leicestershire LE6 5JU
(P&P included) Tel: 0530 411485

BIGGER, BOULDER, More BEAUTIFUL

AMERICAN NO 1.

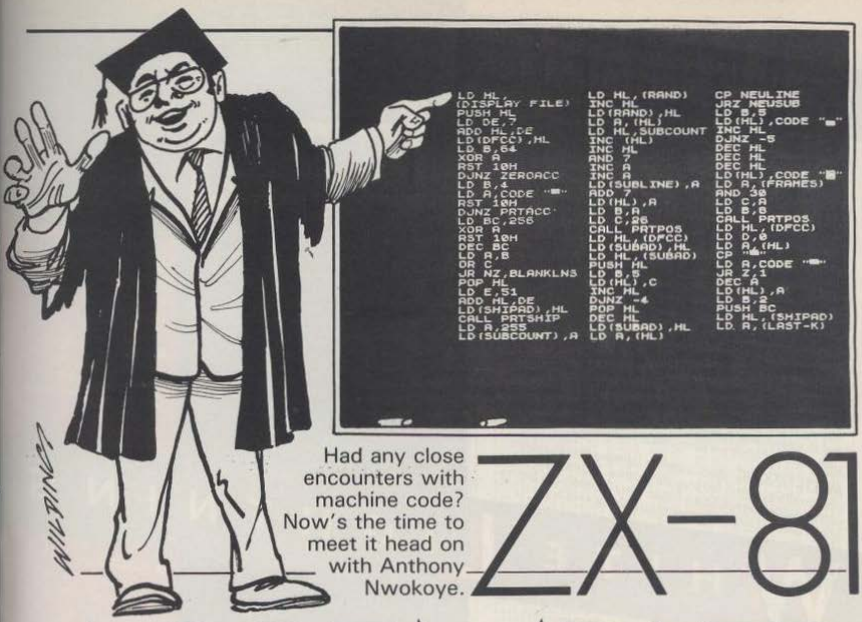


CASSETTE 8·95 DISK 10·95

I wish to pay by cash/cheque/Postal Order/Access
To ACCESS ...
I authorise you to debit my Access
Account with the amount of £ _____
My ACCESS No is
_____
Name (as on Access card)
Cardholder's address
Signature

State Soft Ltd,
Business & Technology Centre,
Bessemer Drive, Stevenage,
Hertfordshire SG1 2DY.
Phone (0438) 316561.

Really Something Else



Had any close encounters with machine code? Now's the time to meet it head on with Anthony Nwokoye.

ZX-81 ASSEMBLER

THIS PROGRAM WAS written for ZX-81 owners who would like to move on to machine code but who do not want to buy all the necessary assemblers, monitor, etc. It only occupies 3.75K of memory, above RAMtop, and has features you would expect to find from the top commercial products. These features are:

- The ability to assemble any Z-80 instruction — pages 181 to 187 of ZX-81 Basic Manual.
- It assembles to any part of the memory.
- It handles all labels, including those which require 16-bit address.
- It accepts decimal, hex or binary numbers.
- The ability to have messages imbedded in your code by putting the message between quotes.
- Comments and reminders may be placed after an asterisk. You can also have multiple instruction, with each separated by a semi-colon — the whole code could be assembled from one line.

With these facilities, it would make it easier to write fast and smooth arcade-type games, and improve your machine-code techniques.

The machine code itself is stored in a Rem line 3,871 bytes long. This is obtained by first entering

1 REM 221 characters.

then edit line 1 and change it to 2 and edit 2 and change it to 3 and so on, until you have 1 to 17 lines.

Then add

18 REM 7 characters

then you POKE 16512,15
POKE 16511,28

then you enter the hex loader. Once you've entered the code and saved it to tape you can try out the assembler.

Load the program. When it has been loaded you should list it. You will see a long Rem statement followed by a mixture of weird characters. This is the machine-code assembler and the computer is only listing the first 400 bytes or so of the code. This code needs to be about RAMtop, so to do this you type:

PRINT USR 16514 . . . (Newline)

and then you will see the computer New itself as it sends the code above RAMtop and clear itself.

Now that the computer is clear and the machine code is above RAMtop, you are ready to enter your mnemonics. I am going to have difficulty explaining this, so please stay awake!

Before entering your mnemonics, you need to enter a Rem line that is suitable to hold the code. The code does not have to start at 16514, it can start at, say, 22000. Before any mnemonics are entered you need a Rem line with an opening bracket, so the assembler knows where the code begins such as;

1 Rem . . . necessary bytes
10 Rem (open brackets

(continued on page 143)

The Hex Loader

```
 99 REM HEX LOADER
100 PRINT "START ADDRESS"
110 INPUT S
120 PRINT "FINISH ADDRESS"
130 INPUT F
140 FOR N=S TO F STEP 8
150 LET T=0
160 PRINT N;" - ";
170 INPUT A$
180 PRINT A$;" = ";
190 INPUT TOT
200 PRINT TOT
210 LET Z=0
220 FOR K=1 TO LEN A$ STEP 2
230 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
240 LET T=T+C
250 POKE N+Z,C
260 LET Z=Z+1
270 NEXT K
280 IF TOT=T THEN GO TO 310
290 PRINT "ERROR - PLEASE INPUT
AGAIN"
300 GO TO 150
310 NEXT N
```

THE KEY TO PROFESSIONAL GAMES DESIGN

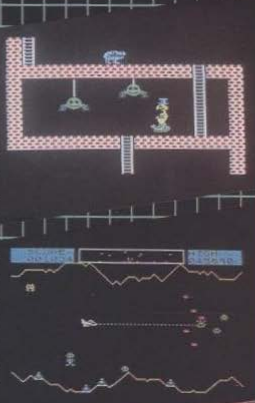
ON THE SPECTRUM 48K

THE GAMES LANGUAGE OF THE 80'S!

Now, without any knowledge of machine code, you can write fast, smooth, professional, totally original games and market them **without paying royalties.**
Even if you have already mastered machine code, we believe that the time and problems saved by writing in **White Lightning's** FORTH– based high level language could revolutionise commercial games writing for years to come.

IDEAL IDEAL is an Interrupt Driven Extendible Animation sub-Language. Once you have mastered IDEAL's easy to learn set of over 80 commands and just a little FORTH, you will be ready to produce arcade-quality games even if you don't know machine code. Up to 255 Sprites, each with its own user-defined dimensions can be moved around the screen (or memory), scrolled, spun, reflected enlarged or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and Sprite windows. Sprites can even stretch across several screens, so those difficult scrolling landscapes that form the basis of so many games are easy to achieve. Sinclair's own sound and graphics commands such as CIRCLE, DRAW and BEEP are fully supported, and there are some unique collision detection facilities.

MULTI-TASKING Because **White Lightning** uses interrupts, you can effectively run two programs at once. This means of course, that games like Space Invaders and Defender can be written without complex timing calculations. So while one



- Produces real machine code programs which run independently of White Lightning.
- A multi-tasking animation language AND a Sprite Development program together in one system-pack.

WHITE LIGHTNING

program smoothly scrolls the landscape, the second animates the other characters. This is undoubtedly one of White Lightning's most powerful features.

MARKETING AND PORTABILITY Although **White Lightning** uses an integer FORTH as its host language, programs can be written in a combination of BASIC, FORTH, IDEAL and machine language.
What is more, programs written in FORTH/IDEAL will be highly portable between the Spectrum and implementations under development for other popular micros.
When it comes to marketing your completed games, there's no problem either. In fact Oasis themselves will offer to market outstanding software.

SPRITE DESIGN White Lightning, comes complete with a separate 20K program for developing the Sprites used in the main system. Not only can you use this to design your own Sprites from scratch, it also comes complete with 168 pre-defined characters covering games like **Asteroids, Pac-Man, Assault Course, Defender, Space Invaders, City Bomber, Lunar Lander, Frogger, Centipede, Donkey Kong** and many, many, more. These characters are ready to use or can be enhanced. And Sprites can be saved to tape between editing sessions before being finally loaded into the main program.

- Supplied with a FREE 16-minute demo, and a 130-page, easy-to-follow manual.

The High Level Graphics Development System for the SPECTRUM 48K . . . . .

OASIS SOFTWARE

AND COMING SOON! the power of White Lightning on the COMMODORE 64!

If your local dealer doesn't stock White Lightning, just send off this coupon for our rapid-despatch service.

Please send me ___ White Lightning System Packs at £14.95 each. I enclose my cheque/P.O. for £ ___

Name: ___

Address: ___

Oasis Software 9a Alexandra Parade, Weston-super-Mare, Avon, BS23 1QT Telephone: (0934) 419921. Every product carries a lifetime guarantee. All prices include extensive manual, VAT and p&p.

24 Hour Access Tele-ordering on (0934) 419921.

YC 10

(continued from page 141)

all mnemonics are entered in Rem lines like so:

```
1 Rem . . .
10 Rem (
20 Rem Ld A.0
```

to have multiple statements use a semicolon:

```
1 Rem . . .
10 Rem (
20 Rem LD A.0; RST16; BIT 7.(HL); etc
```

The use of labels makes any assembler, without doubt, much easier to use. They are used in instructions like JR or DJNZ, and you can even have 16-bit labels where the computer fills in the necessary two bytes. To enter a label you have to type a colon followed by an L and then the label number, and then again a colon. You have to do this before the required statement, like so:

```
1 Rem . . .
10 Rem (
20 Rem: L1:INC HL; JR L1
```

The label number can be anything from 0 to 255 and must not exceed these values as the labelling system won't work correctly.

Now for the 16-bit label. In an operation like so:

```
1 Rem . . .
10 Rem (
20 Rem :LO:SET 7.A;XORA etc . . .
```

(continued on next page)

Assembler hex dump

```
18514: 11B6ECED53044021 = 717
18522: 94400210A0FEDB0C3 = 848
18530: C3BDC047CD17BE = 928
18539: EC43C3FF21000223 = 780
18547: F7FD213A0E0223 = 939
18554: 3E003E77FE10000 = 939
18562: 8F5F7E11660223 = 893
18570: 7E23E5D5C5F5 = 1050
18578: 002AFC7F22ED7F23 = 894
18586: 2A2A2A2A2A7F110 = 688
18594: 007EFE20C0C9C1D1 = 859
18602: E1C9CDC0C0C9C1 = 844
18610: 5F6E6E5C5B7BFE08 = 1018
18618: 20F7C9C5D5E5F5 = 1050
18626: 11CAE16DFE17E3C1 = 1063
18634: 7E23E5D5C5F5 = 1208
18642: 2A2A2A2A2A7F110 = 850
18650: 3E40CD2F6E2AF37F = 900
18658: 2A2A2A2A2A2AF17F = 894
18666: E92A6EC37EFE10CA = 1192
18674: 2A2A2A2A2A2A7F = 1139
18682: E2F37FE1E1E2E2E1 = 908
18690: 7B2A6C7F2A2A0FE2A = 973
18698: 2A2A2A2A2A2A2A = 1139
18706: 4AD2A8E6CD12F278 = 1011
18714: 2A2A2A2A2A2A2A = 1214
18722: 7B7F2A7F7FFE0128 = 967
18730: 2AFEF6E8E2E2E2E2 = 998
18738: 2A2A2A2A2A2A2A = 1214
18746: 4C3E6C2A7EFE2A2A = 1006
18754: 2A2A2A2A2A2A2A = 1214
18762: 7F2A3E4AE5E7E7E3 = 991
18770: 2A2A2A2A2A2A2A = 1214
18778: FE27CA6D7D2AFE7F = 1139
18786: 2A6DE17CE2AFE7F = 1028
18794: 7D6DE17CE2AFE7F = 1028
18802: 2A2A2A2A2A2A2A = 1214
18810: 2A2A2A2A2A2A2A = 1037
18818: 2A2A2A2A2A2A2A = 1117
18826: E8E13217E7B07E12 = 277
18834: 2A2A2A2A2A2A2A = 1196
18842: 5AB57FEFD0C4A6BF = 1195
18850: 3AF37FEFD0C4A6BF = 1052
18858: 3AF37FEFD0C4A6BF = 1052
18866: 3A3E3D0C2A6E3A3E = 305
18874: 2A2A2A2A2A2A2A = 1214
18882: 0000000000000000 = 0
18890: 0000000000000000 = 0
18898: 0000000000000000 = 0
18906: 0FA6E1D2C1C5E111 = 995
18914: 07D01E1E1E1E1E1E = 1028
18922: 7FED4BE87F7DE800 = 1139
18930: 2A2A2A2A2A2A2A = 1092
18938: 7F2A2A2A2A2A2A = 1214
18946: 2A2A2A2A2A2A2A = 856
18954: 2A2A2A2A2A2A2A = 1043
18962: 2D0E7B6D2D2D2D2D = 416
18970: 2A2A2A2A2A2A2A = 1214
18978: 1E0C2A6E7FE32ED = 958
18986: 2A2A2A2A2A2A2A = 1214
18994: ED7B2A6E7FE32ED = 1014
19002: 0B8E0E7C3A31AFE6 = 499
19010: 2A2A2A2A2A2A2A = 1214
19018: F8FFC0C0C3FE3E1C = 1078
19026: 2A2A2A2A2A2A2A = 1214
19034: 83FFFE83FFE83FFE = 1626
19042: 2A2A2A2A2A2A2A = 1214
19050: 0H3EE47FEFE1CDA0 = 833
19058: 2A2A2A2A2A2A2A = 1214
19066: 0D2A6E7FE3E1FFFE = 925
19074: 2A2A2A2A2A2A2A = 1069
19082: 21FE407FFE47CA85 = 901
19090: 2A2A2A2A2A2A2A = 1158
19098: CA597DFE4DCA5570 = 1277
19106: FEFFCAE8FFFE2DCA = 1334
19114: 2A2A2A2A2A2A2A = 1423
19122: 2A2A2A2A2A2A2A = 551
19130: 2A2A2A2A2A2A2A = 1056
19138: 2A2A2A2A2A2A2A = 976
19146: CA8D7D3E2E2E0 = 871
19154: 2A2A2A2A2A2A2A = 1214
19162: 3E1E02E4FFE1380 = 723
19170: 2A2A2A2A2A2A2A = 1214
19178: 7D21E3E407FEFE2E = 935
19186: 2A2A2A2A2A2A2A = 1214
19194: 2A2A2A2A2A2A2A = 1214
19202: FC2A6E7FE2E2E2E2 = 1289
19210: 2A2A2A2A2A2A2A = 1214
19218: 7F2A3E1F7FE2E2E2 = 1214
19226: 2A2A2A2A2A2A2A = 1214
19234: 2A2A2A2A2A2A2A = 1214
19242: 2A2A2A2A2A2A2A = 1214
19250: 2A2A2A2A2A2A2A = 1214
19258: 2A2A2A2A2A2A2A = 1214
19266: 2A2A2A2A2A2A2A = 1214
19274: 2A2A2A2A2A2A2A = 1214
19282: 2A2A2A2A2A2A2A = 1214
19290: 2A2A2A2A2A2A2A = 1214
19298: 2A2A2A2A2A2A2A = 1214
19306: 2A2A2A2A2A2A2A = 1214
19314: 2A2A2A2A2A2A2A = 1214
19322: 2A2A2A2A2A2A2A = 1214
19330: 2A2A2A2A2A2A2A = 1214
19338: 2A2A2A2A2A2A2A = 1214
19346: 2A2A2A2A2A2A2A = 1214
19354: 2A2A2A2A2A2A2A = 1214
19362: 2A2A2A2A2A2A2A = 1214
19370: 2A2A2A2A2A2A2A = 1214
19378: 2A2A2A2A2A2A2A = 1214
19386: 2A2A2A2A2A2A2A = 1214
19394: 2A2A2A2A2A2A2A = 1214
19402: 2A2A2A2A2A2A2A = 1214
19410: 2A2A2A2A2A2A2A = 1214
19418: 2A2A2A2A2A2A2A = 1214
19426: 2A2A2A2A2A2A2A = 1214
19434: 2A2A2A2A2A2A2A = 1214
19442: 2A2A2A2A2A2A2A = 1214
19450: 2A2A2A2A2A2A2A = 1214
19458: 2A2A2A2A2A2A2A = 1214
19466: 2A2A2A2A2A2A2A = 1214
19474: 2A2A2A2A2A2A2A = 1214
19482: 2A2A2A2A2A2A2A = 1214
19490: 2A2A2A2A2A2A2A = 1214
19498: 2A2A2A2A2A2A2A = 1214
19506: 2A2A2A2A2A2A2A = 1214
19514: 2A2A2A2A2A2A2A = 1214
19522: 2A2A2A2A2A2A2A = 1214
19530: 2A2A2A2A2A2A2A = 1214
19538: 2A2A2A2A2A2A2A = 1214
19546: 2A2A2A2A2A2A2A = 1214
19554: 2A2A2A2A2A2A2A = 1214
19562: 2A2A2A2A2A2A2A = 1214
19570: 2A2A2A2A2A2A2A = 1214
19578: 2A2A2A2A2A2A2A = 1214
19586: 2A2A2A2A2A2A2A = 1214
19594: 2A2A2A2A2A2A2A = 1214
19602: 2A2A2A2A2A2A2A = 1214
19610: 2A2A2A2A2A2A2A = 1214
19618: 2A2A2A2A2A2A2A = 1214
19626: 2A2A2A2A2A2A2A = 1214
19634: 2A2A2A2A2A2A2A = 1214
19642: 2A2A2A2A2A2A2A = 1214
19650: 2A2A2A2A2A2A2A = 1214
19658: 2A2A2A2A2A2A2A = 1214
19666: 2A2A2A2A2A2A2A = 1214
19674: 2A2A2A2A2A2A2A = 1214
19682: 2A2A2A2A2A2A2A = 1214
19690: 2A2A2A2A2A2A2A = 1214
19698: 2A2A2A2A2A2A2A = 1214
19706: 2A2A2A2A2A2A2A = 1214
19714: 2A2A2A2A2A2A2A = 1214
19722: 2A2A2A2A2A2A2A = 1214
19730: 2A2A2A2A2A2A2A = 1214
19738: 2A2A2A2A2A2A2A = 1214
19746: 2A2A2A2A2A2A2A = 1214
19754: 2A2A2A2A2A2A2A = 1214
19762: 2A2A2A2A2A2A2A = 1214
19770: 2A2A2A2A2A2A2A = 1214
19778: 2A2A2A2A2A2A2A = 1214
19786: 2A2A2A2A2A2A2A = 1214
19794: 2A2A2A2A2A2A2A = 1214
19802: 2A2A2A2A2A2A2A = 1214
19810: 2A2A2A2A2A2A2A = 1214
19818: 2A2A2A2A2A2A2A = 1214
19826: 2A2A2A2A2A2A2A = 1214
19834: 2A2A2A2A2A2A2A = 1214
19842: 2A2A2A2A2A2A2A = 1214
19850: 2A2A2A2A2A2A2A = 1214
19858: 2A2A2A2A2A2A2A = 1214
19866: 2A2A2A2A2A2A2A = 1214
19874: 2A2A2A2A2A2A2A = 1214
19882: 2A2A2A2A2A2A2A = 1214
19890: 2A2A2A2A2A2A2A = 1214
19898: 2A2A2A2A2A2A2A = 1214
19906: 2A2A2A2A2A2A2A = 1214
19914: 2A2A2A2A2A2A2A = 1214
19922: 2A2A2A2A2A2A2A = 1214
19930: 2A2A2A2A2A2A2A = 1214
19938: 2A2A2A2A2A2A2A = 1214
19946: 2A2A2A2A2A2A2A = 1214
19954: 2A2A2A2A2A2A2A = 1214
19962: 2A2A2A2A2A2A2A = 1214
19970: 2A2A2A2A2A2A2A = 1214
19978: 2A2A2A2A2A2A2A = 1214
19986: 2A2A2A2A2A2A2A = 1214
19994: 2A2A2A2A2A2A2A = 1214
20002: 2A2A2A2A2A2A2A = 1214
20010: 2A2A2A2A2A2A2A = 1214
20018: 2A2A2A2A2A2A2A = 1214
20026: 2A2A2A2A2A2A2A = 1214
20034: 2A2A2A2A2A2A2A = 1214
20042: 2A2A2A2A2A2A2A = 1214
20050: 2A2A2A2A2A2A2A = 1214
20058: 2A2A2A2A2A2A2A = 1214
20066: 2A2A2A2A2A2A2A = 1214
20074: 2A2A2A2A2A2A2A = 1214
20082: 2A2A2A2A2A2A2A = 1214
20090: 2A2A2A2A2A2A2A = 1214
20098: 2A2A2A2A2A2A2A = 1214
20106: 2A2A2A2A2A2A2A = 1214
20114: 2A2A2A2A2A2A2A = 1214
20122: 2A2A2A2A2A2A2A = 1214
20130: 2A2A2A2A2A2A2A = 1214
20138: 2A2A2A2A2A2A2A = 1214
20146: 2A2A2A2A2A2A2A = 1214
20154: 2A2A2A2A2A2A2A = 1214
20162: 2A2A2A2A2A2A2A = 1214
20170: 2A2A2A2A2A2A2A = 1214
20178: 2A2A2A2A2A2A2A = 1214
20186: 2A2A2A2A2A2A2A = 1214
20194: 2A2A2A2A2A2A2A = 1214
20202: 2A2A2A2A2A2A2A = 1214
20210: 2A2A2A2A2A2A2A = 1214
20218: 2A2A2A2A2A2A2A = 1214
20226: 2A2A2A2A2A2A2A = 1214
20234: 2A2A2A2A2A2A2A = 1214
20242: 2A2A2A2A2A2A2A = 1214
20250: 2A2A2A2A2A2A2A = 1214
20258: 2A2A2A2A2A2A2A = 1214
20266: 2A2A2A2A2A2A2A = 1214
20274: 2A2A2A2A2A2A2A = 1214
20282: 2A2A2A2A2A2A2A = 1214
20290: 2A2A2A2A2A2A2A = 1214
20298: 2A2A2A2A2A2A2A = 1214
20306: 2A2A2A2A2A2A2A = 1214
20314: 2A2A2A2A2A2A2A = 1214
20322: 2A2A2A2A2A2A2A = 1214
20330: 2A2A2A2A2A2A2A = 1214
20338: 2A2A2A2A2A2A2A = 1214
20346: 2A2A2A2A2A2A2A = 1214
20354: 2A2A2A2A2A2A2A = 1214
20362: 2A2A2A2A2A2A2A = 1214
20370: 2A2A2A2A2A2A2A = 1214
```

(continued from previous page)

30 Rem LD BC. LO — here, BC is loaded with the 16-bit address of where label 0 would be when the mnemonics are assembled.
or:
20 Rem: LO:SET 7.A;XOR A etc . . .
30 Rem Call LO — the address is automatically done when assembled. In all the examples I've used decimal numbers, but I could easily use hex or even binary numbers. To enter a hex number, you must put an asterisk before it like so:

LD A.*2A, or LD DE.*B2CA

For a binary number, you put a plus sign before it like so:
LD, HL, +0110101010000101, or
LD C. + 10100011
One of the special features of this assembler, is that you can have messages imbedded in your code. These can also be labelled and are put betweeen quotes. Here is an example:
1 Rem . . .
10 Rem (
20 Rem "THIS IS A MESSAGE"
and label the same like so:
1 Rem . . .
10 Rem (
20 Rem:LS:"THIS IS A MESSAGE"
30 Rem LD HL.LS;LD BC. etc.

To have reminders and comments in your mnemonics, so you know which part does what, you use an asterisk. This is put before the reminder.
Like so:
1 Rem . . .
10 Rem (
20 Rem *THIS IS A COMMENT
30 Rem LD HL 2A0K; etc
40 Rem * THIS IS etc and so on.

Now when you've finished your mnemonics, you enter a Rem) close brackets. This has to be at a line, at the end of your mnemonics. This is so the assembler knows when the end of assembling has been reached. Then you type in this short program to run the assembler:

```
9990 LET ADD = 16514
9991 POKE 32767, INT (ADD/256)
9992 POKE 32766, ADD — 256*INT
     (ADD/256)
9993 LET A = USR 27819
```

The value of Add doesn't have to be 16514, but can be any address where memory is reserved for the code, except 27819 or upwards as this holds the assembler and the label stack. Both address 32766 and 32767 will hold the address of the place the assembler should dump to.

Now for the moment of truth. Type Run. You should see the screen flicker and at the top of the screen:

LOOP ACCOMPLISHED

should have been written. This means that if you now List the program, you will see at line number 1 the compiled machine code, and all is well.

However, if the computer prints:
I CAN'T ASSEMBLE ONE OF THE CODES
then it means that you've made an error with one of the mnemonics. To help you find the error the computer displays at the bottom of the screen a 9 followed by a / sign. After this is the number logo where the mistake occured so:

9/5

would mean a mistake has happened at loop 5.

If the computer prints:
YOU HAVE MISSED A LABEL USING JUMP
it simply means that you have in the mnemonics requested a label using JR, DJNZ etc when this label doesn't exist.
YOU HAVE MISSED A LABEL USING CALL
would mean that you've requested a non-existent label, maybe using CALL L92, LD HL. L12 etc.

There must only be one space between the command and the next number or register in the mnemonics. For example LD (65535). A is acceptable, while LD (65635). A is not. You use a full stop or a space to separate each section. For example, LD A.B. is good, as is LD A B. All RST should have their numbers in decimal and have the numbers close to the letters like: RST48. All label numbers should be in decimal, and there should be no space at the end of the line. ■

Example program 1.

```
   1 REM ......................
.............................
.............................
........
   5 REM EXAMPLE1
  10 REM (
  20 REM *RANDOM PLOT*
  25 REM *(THIS MUST BE LOADED
 WITH ASSEMBLER ABOVE RAMTOP.)
  30 REM *READY TO BE ASSEMBLED
 WITH SUPER "SEMBLER AT ADDRESS
16514.
  40 REM *BREAK M/C WITH SHIFT.
  50 REM JR L1
  60 REM :L0:*RAND;LD HL.(16434)
  70 REM LD DE.(16435);ADD HL.DE
  80 REM LD DE.(16436);ADD HL.DE
;LD (16434).HL;LD A.L;RET
  90 REM :L1:CALL L0;AND 63
 100 REM LD C.A
 110 REM :L2:CALL L0;AND 63
 120 REM CP 44;JR NC L2;LD B.A
 130 REM CALL 2994
 140 REM LD A.(16422);CP 254;RET
Z;JR L1
 150 REM )
9990 LET ADD=16514
9991 POKE 32767,INT (ADD/256)
9992 POKE 32766,ADD-256*INT (ADD
/256)
9993 LET A=USR 27819
```

Example program 2.

```
   1 REM ......................
.............................
.............................
........
   5 REM EXAMPLE2
  10 REM (
  20 REM *PRINT ROUTINE*
  25 REM *(THIS MUST BE LOADED
 WITH ASSEMBLER ABOVE RAMTOP.)
  30 REM *READY TO BE ASSEMBLED
 WITH SUPER "SEMBLER AT ADDRESS
16514.
  40 REM LD B.52;:L0:PUSH BC
  50 REM LD DE.L2;PUSH DE
  60 REM LD B.14;:L1:LD A.(DE);A
DD A.128;LD (DE).A
  70 REM INC DE;DJNZ L1
  80 REM POP DE;LD BC.14
  90 REM CALL 2923
 100 REM POP BC;DJNZ L0;RET
 110 REM :L2:"YOUR COMPUTER,"
 120 REM )
9990 LET ADD=16514
9991 POKE 32767,INT (ADD/256)
9992 POKE 32766,ADD-256*INT (ADD
/256)
9993 LET A=USR 27819
```

Example program 3.

```
   1 REM ......................
.............................
.............................
........
   5 REM EXAMPLE3
  10 REM (
  20 REM *CHARACER SET*
  25 REM *(THIS MUST BE LOADED
 WITH ASSEMBLER ABOVE RAMTOP.)
  30 REM *READY TO BE ASSEMBLED
 WITH SUPER "SEMBLER AT ADDRESS
16514.
  40 REM LD C.127;:L0:PUSH BC
  50 REM LD DE.(16396);LD C.24
  60 REM :L1:LD B.32;:L2:INC DE;
LD A.(DE);INC A
  70 REM BIT 6.A;JR Z L3;RES 6.A
;SET 7.A
  80 REM :L3:LD (DE).A;DJNZ L2
  90 REM INC DE;DEC C;JR NZ L1
 100 REM LD DE.650;:L4:DEC DE;LD
A.D;OR E;JR NZ L4
 110 REM POP BC;DEC C;JR NZ L0
 120 REM RET
 130 REM )
9990 LET ADD=16514
9991 POKE 32767,INT (ADD/256)
9992 POKE 32766,ADD-256*INT (ADD
/256)
9993 LET A=USR 27819
```

Cobolt

Direct imports at ridiculous prices

NEW BASE-LESS JOYSTICK

- Just tilt to operate.
- Single shot trigger.
- Auto-fire button.
- Use it single handed.
- No more wrist cramp.
- No more table suckers.
- Standard joystick connector.

£8.95

All products have a full no-quibble guarantee

COMPUTER DATA RECORDER

- For most home micros.
- 3 digit tape counter.
- Low battery indicator.
- Switchable monitor.
- Input, output, Din and remote sockets.
- Mains power pack £4.95.

£19.95

Also a version for Vic 20 and Commodore 64. Powered and controlled by the computer.

£21.95

Not a modified Audio machine — A top quality computer data recorder.

Our low introductor prices include VAT and UK postage.

We have an expanding range of products — send a large SAE for the latest lists.

Trade and overseas enquiries welcome.

See us at the Christmas Computer show at Olympia. Nov 30-Dec 2.

To: **Cobolt Systems Ltd.**
37 Eastgate Pickering, YO18 7DU.
Tel: 0751-73315

NAME: .....

ADDRESS: .....

.....

Please send me.....

I enclose: £

GAMES . . . GAMES . . . GAMES

THE VIRGIN COMPUTER GAMES SERIES

£££££'s of Entertaining Games for only £2.95

Each book contains more than 20 quality games programmes, each one specially written for the series and unavailable elsewhere. Moving graphic games, arcade games, reflex flexers and brain stretchers are all here and guaranteed to provide hours of entertainment.

Only £2.95 each

- GAMES FOR YOUR ZX 81
- MORE GAMES FOR YOUR ZX 81 (£3.50)
- GAMES FOR YOUR ZX SPECTRUM
- MORE GAMES FOR YOUR ZX SPECTRUM (£3.50)
- GAMES FOR YOUR VIC 20
- MORE GAMES FOR YOUR VIC 20
- GAMES FOR YOUR BBC MICRO
- MORE GAMES FOR YOUR BBC MICRO
- GAMES FOR YOUR DRAGON
- MORE GAMES FOR YOUR DRAGON
- GAMES FOR YOUR ATARI
- GAMES FOR YOUR ATARI 600XL
- GAMES FOR YOUR TRS 80
- GAMES FOR YOUR ORIC
- MORE GAMES FOR YOUR ORIC
- GAMES FOR YOUR COMMODORE 64
- MORE GAMES FOR YOUR COMMODORE 64
- GAMES FOR YOUR ACORN ELECTRON
- GAMES FOR YOUR TI 99/4A

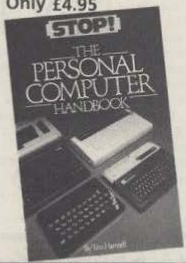
THE PERSONAL COMPUTER HANDBOOK

3rd Annual Edition

TIM HARTNELL

The complete guide to selecting and using small computers, including an explanation of how they work and what they can do for you, a detailed analysis of the available systems on the market and how to buy them, and how to get the most from your computer with an extended step-by-step guide to programming.

Only £4.95



WRITING SOFTWARE FOR PROFIT

A.J. HARDING

Most software authors begin writing programs at home and many have dreams of seeing their hardwork published. With this in mind, this book examines how to choose the right machine and the right computer software before explaining in depth the best approach to program writing and submitting your finished program.

£4.95

Available from all good bookshops, or direct from the publishers adding 12½% to the price of each book ordered to cover our postage and packing. Please make cheques/P.O's payable to Virgin Books and send to: Computer Books Offer 3, Virgin Books, 61–63 Portobello Road, London W11 3DD

NOW 3RD GREAT YEAR!

HIRE

SPECTRUM ZX81 and COMMODORE 64 TAPES

HUGE RANGE! ADVENTURE GAMES, ARCADE and SIMULATION GAMES, BUSINESS and PRACTICAL PROGRAMS, UTILITIES, M/c COMPILERS, EDUCATIONAL FROM OVER 60 TOP SUPPLIERS

FREE ILLUSTRATED QUARTERLY MAGAZINE WITH TIPS, NEWS, REVIEWS, DISCOUNT OFFERS

LIFE MEMBERSHIP £5·00 TAPE HIRE FROM 50p (+ EXCLUDING VAT)

OVER 3,000 DELIGHTED MEMBERS!

■ The first true software library to be set up in the world—and still the largest ■ Unrivalled tape stock, as you'd expect from our head start ■ Run by a 16-bit computer (2 million bytes of program and data on disk!) with the help of six less able but more friendly mere humans! ■ Often imitated (sometimes almost to the letter—flattery indeed!) but never equalled ■ Friendly, helpful service—at the end of a phone if needed ■ Free membership of our Discount Club: pounds off peripherals and top-of-the-chart tapes ■ Any loading problems (rare!) automatically credited ■ Shop now open (next to Post Office) for rental and discount sales of tapes and peripherals ■ Branches throughout the world ■ No complicated schemes, no commitment to quantity—rent what and when you like ■ Printed, illustrated magazine "Computerchat" packs in more than any mere typed newsletter ■ Keenest-ever rates ■ ACCESS holders can join by telephone on 0730 892732 ■ NO RIVAL can offer all this....

SPECIAL OFFER! YOUR FIRST TWO TAPES FREE IF YOU USE THIS COUPON!

or send £1 for magazine & details. Props: ALEC FRY ARPS, FRSA and ERNA FRY, BA

To: SOFTWARE LIBRARY, Farnham Road, West Liss, Hants GU33 6JU.

NAME.....Machine.....

ADDRESS.....

.....

THE ORIGINAL SOFTWARE LIBRARY!

Special offer from this issue: LIFE MEMBERSHIP £5 (normally £9.50). Overseas (Europe only) £10, or join local branch in W. Germany, France, Holland, Belgium, Scandinavia, South Africa, Ireland—send Int. Reply Coupon and we'll forward your enquiry.

YC

TRIONIC

Your *Local* Home Computer Centre

Best Shop in Town for Software, Books, Mags, Peripherals and Accessories.

We sell and support: Amstrad, Atari, BBC, Commodore C16, CBM 64, CBM Plus 4, Electron Spectrum 48K, Sony Hit-Bit (MSX).

We are one of the Largest Stockists of Games, Business and Educational Software and Utilities for all Popular Home Computers.

Amstrad CPC464 Green Monitor	£239
Amstrad CPC464 Colour Monitor	£349
Commodore C16 Starter Pack	£139
Commodore 64	£199
Commodore 64 Trionic Pack	£249
Commodore 64 Business Pack	£629
BBC Model B Micro	£399
Acorn Electron	£199
Spectrum 48K	£129
Sony Hit Bit MSX Computer	£299

We also stock a large range of Printers, Monitors and Disk Drives to suit all applications.

OPEN 10am-8pm Mon-Sat. Tel: 01-861 0036

TRIONIC LIMITED 144 Station Road, Harrow, Middlesex

MULTITASKING

Easy multitasking with Richard Taylor's After and Every.

SPECTRUM INTERRUPTS

ONE OF THE most advanced features of the Amstrad micro is its ability to handle interrupts directly from Basic. In other machines such as the Spectrum, interrupts are a tool available only to the machine-code programmer. Amstrad Basic releases the power of interrupts to all in a simple but comprehensive manner.

Although Spectrum interrupts can be harnessed quite readily – at least on the 48K machine – from machine code, the Basic programmer is left out in the cold with no commands to support interrupt-driven programming. Presented here is a program which rectifies this shortcoming by equipping Spectrum Basic with a number of interrupt commands, as well as the On Error and On Break commands found in Microsoft Basic. Due to the problems associated in accessing interrupts, even from machine code, on a 16K machine, it will only operate on the larger model.

The machine code resides above RAMtop, occupying addresses 63866 to 65367. Type in listing 1 and Run it. The program automatically lowers RAMtop and proceeds to Poke the code into memory. Each of the 23 data lines holding the code in a hexadecimal form has an associated checksum. If at any time the code in a line doesn't tally with its checksum then the computer stops, displaying the line at which the discrepancy was found.

When the code is in a form that the computer will readily accept — i.e., correct — you can save the code using the command below. Don't worry about the long delay while the computer Pokes the code; it takes a couple of minutes and don't be concerned by the blank screen, the computer hasn't crashed — hopefully.

```
SAVE "MULTI-TASK"CODE 63866,1413
```

You can reload at any time with:

```
CLEAR 63000: LOAD ""CODE
```

The 10 new Basic commands provided by the program can be accessed by typing them in in Rem statements. There's a limit of one command per Rem and, as usual, a Rem statement must be the last item on a line. To make the computer treat Rems in this new fashion it is necessary to initialise the machine code by using a Randomise USR 63866 as the first line of your program. Subsequently, Rems will be treated in the new manner with no further need for USR calls. The full command list is as follows:

AFTER	ON ERROR GOTO
EVERY	ON BREAK STOP
DISABLE	ON BREAK GOSUB
ENABLE	IGNORE BREAK
DROP	RESUME

I'll now deal with each of the commands individually. The simplest command is Ignore Break. As you would expect this command forces a program to ignore the break key and therefore prevents you from breaking into it. As an example, type in the following short program, but only if there's nothing important in memory.

```
10 RANDOMIZE USR 63866
20 REM IGNORE BREAK
30 GOTO 30
```

Pulling out the plug is the only way out of this program. The command in line 20 is typed in letter by letter, a little more laborious than single key entry but certainly a lot less confusing. You can type in either upper or lower case but upper case tends to look a bit neater. If the first character of a Rem is an asterisk then the rest of the line is ignored. In this way you are still able to add comments to a program.

The next command, On Break Stop restores normality to the break key:

(continued on next page)

Listing 1.

```
 10 REM        MULTITASKING
 20 REM      BASIC EXTENSION
 30 REM
 40 REM    By Richard Taylor
 50 REM
 60 CLEAR 63000
 70 LET a=63866
 80 FOR i=0 TO 22
 90 LET t=0: READ v,a$
100 IF LEN a$ = 2*INT (LEN a$/2)
THEN GO TO 500
110 FOR c=1 TO LEN a$ STEP 2
120 LET x=CODE a$(c)-48-7*(a$(c
)>"9"):
130 LET y=CODE a$(c+1)-48-7*(a$
(c+1)>"9"):
140 POKE a,16*x+y
150 LET t=t+16*x+y
160 LET a=a+1
170 NEXT c
180 IF v<>t THEN GO TO 500
190 NEXT i
200 PRINT "Data OK - Now SAVE"
210 STOP
500 PRINT "ERROR in line ";9000
+i*10
510 STOP
9000 DATA 7666,"C321FDC31AFDC321
FBDFCD882C3022CD9D2C3808CD3B2DCD
99ICFC9237EFED0280FFE2280BFE21
38FACD882C338EDCF0ECDB2283806230D
B1331EDECF01CF1A"
9010 DATA 8000,"E67F4F7E23FE2038
FAFE20B9200A1A1317308C2E5D5C3769
1A1317308FBB7C9616867468F29DFC6576
8572F2AEFC6146B2616262CE5E2FB656E
81626CE51CF7228"
9020 DATA 7872,"737566DE54CFC6F8E
2065727267726065767467EF7FFC6F8E2D
6272656116202374FF05EFAFFE2002
72656160206767F7375E272FA6967EEF
72652062726561E8"
9030 DATA 3865,"6CFA64726FF0E5FE
00676F737E6211C9F9CDB8F93308131
1AA720F5CF08E85E2356EEE92100FF22
0BFFFDCD7666C02B0DFFC92100FE18EF
C0E3F2E0DC2A9FFD"
9040 DATA 9248,"6966111027B7ED52
1938DCCF0AE7CDBF1EFD3440DDF0600FE
D0222EFE2A8E0218EFE5AFE77F9FEEE
2858FEFA2862FEFECA56FDFEE8CAD0FD
C3441BCD0AFEDFFE"
9050 DATA 6408,"0D2806FE3A28C6CF
08A8555C3EC0A62302CFFFAFFE01CE00
5623CEEB0E3459C235E2356EB19232258
5CEB2A2E5F7F2E2DFD360AFF15FD720D
2B9314D5B1928BE"
9060 DATA 8461,"CF16DFFEEA2003E1
18BFFE0DC8C348FACD5A1CDFFECB28A
1CC1EF023BEBCD9342ADC3FAC387FA2A
```

(listing continued on next page)

(continued from previous page)

```
10 RANDOMIZE USR 63866
20 REM *Press 'a' to get out of this
30 REM IGNORE BREAK
40 IF INKEY$ = "a" THEN REM ON BREAK
   STOP
50 GO TO 40
```

The last of the three commands concerned with the operation of the Break key is On Break Gosub. This is a much more powerful command than the previous two; allowing a full-blooded subroutine to be called when break is pressed. In order to specify which line should be jumped to this command must be followed by a valid line number. You have two options over this, you can either put a number in directly or the name of a variable. What you're not allowed to do is have a mathematical expression, so something like 10+1000 is invalid but 1010 is OK.

The complexity of the break subroutine will obviously depend on the application it is being used for. In many cases it would simply consist of a Run command to restart the program completely if break is pressed. In any case, the operation of the routine is entirely up to you. A break subroutine is written in exactly the same manner as a normal subroutine; terminated with a Return command.

In order to prevent break subroutines nesting themselves by the user pressing break while the break-handling routine is actually running, the key is ignored while the routine is in progress; just as though you'd used Ignore Break. When the terminating Return is reached the original status of break handling is restored. It is possible to redefine the operation of the break key from within the Break handler itself, although its effect won't be initialised until the break routine has finished. The following short example will call the break handler at line 1000 only the first time break is pressed.

```
  10 RANDOMISE USR 63866
  20 REM ON BREAK GOSUB 1000
  30 GO TO 30
1000 PRINT "You've pressed break"
1010 REM ON BREAK STOP
1020 IF INKEY$ = " " THEN GO TO 1020:
     REM *Wait if user still pressing break
1030 RETURN
```

When you write a break handler it is important not to use any variables utilised in the main program as altering them might upset the program when it is Returned to. It's not really a good idea to print on the screen either as your printing might corrupt the layout of the program's own output or even, in some circumstances, cause it to halt with an error.

If your program is menu-driven then it is a good idea to terminate the break routine with a jump to the part of the program which prints the menu. If a user selects the wrong option at the menu then pressing break will immediately return control to the menu without harm.

Disabling the break key might not completely protect a program as there are other places where you may be able to stop it. Namely when the computer asks "scroll?", during any printer/cassette/Microdrive access or by typing Stop in response to an input prompt. However, you can intercept these possibilities by detecting the error reports that they cause using the On Error Goto n command where n is a line number.

This command allows you to trap any sort of error that occurs in a program. When an error

(listing continued from previous page)

```
0880 DATA 7383, 6D6082107FFE55B
0890 DATA 7445, 07FFB7ED52110F00
0900 DATA 7503, 6F6260111F7A9DB
0910 DATA 7589, 3600233600230D7D
0920 DATA 7675, 20F9C9CD7B3DCCDB
0930 DATA 7761, 3E0A32FA5C3E0232
0940 DATA 7095, 3600233600230D7D
```

is detected the computer does a Go To to the given line — not a Gosub although the computer does remember where the error occurred. The error handling routine should be able to competently handle any error that can occur in a program. In common with break subroutines, error routines may just consist of a Run command to restart the program if an error appears.

Some Basics automatically list the line at which an error occurred to give you the opportunity of modifying it if, indeed, it is where the mistake lies. Using the On Error command it is possible to add this facility to ZX Basic. It is necessary to know the line at which the error was found. To be able to do this you need to insert a Def FN command in the first line of the program along with the USR call:

```
10 DEF FN v(a) = USR 63872: RANDOMIZE
   USR 63866
```

Inside the error routine, FN v(8) returns the line at which the error occurred. The self-listing routine is as follows, you might find it a very time saving debugging aid:

```
  10 DEF FN v(a) = USR 63872: RANDOMIZE
     USR 63866
  20 REM ON ERROR GOTO 9990
     <Rest of program>
9990 PRINT "Error ";CHR$ FN v(10);" at line
     ";FN v(8); ":";FN v(9)
9991 PRINT
9992 LIST FN v(8)
```

FN v(9) returns the statement number of the erroneous command and CHR$ FN v(10) returns the alphanumeric code for the error.

The Resume command can be used optional at the end of an error-handling routine to continue execution of a program from the statement where the error was detected. If you follow Resume by a line number then execution continues from that line instead of from the point of the error. You should always terminate error handlers with a Resume if you intend to re-enter the program, never use a Go To. To prevent error handlers from becoming nested, any errors detected within the error routine itself are reported in the usual manner. The following program repeats forever — or at least until you answer no to the "scroll?" prompt. It illustrates the danger of resuming from the point of the error without actually correcting the error's cause.

```
  10 DEF FN v(a) = USR 63872: RANDOMIZE
     USR 63866
  20 REM ON ERROR GOTO 1000
  30 LET a = b: REM *What b?
1000 PRINT "Oh dear, there's been an error"
1010 REM RESUME
```

The use of Verify or Load commands from within a program often causes problems if there is a tape error since you are left in command mode once the error has been reported. If the program is going to be used by people other than its author, then it is necessary to print instructions on the screen of what to do in the event of a tape error to re-enter the program. This works, but is hardly state of the art in user-friendliness.

The On Error command provides a useful solution to this problem by allowing an error handler to be called if a tape error is detected which can invite the user to try again.

There are many instances in a program where it is useful to use an On Error command, most notably when checking the validity of user input. Rather than undergoing complicated checking routines it is much easier to assume that it is right but set up an error routine as a safety net while the input is being processed so that any errors caused by invalid data can be solved by looping back to the input statement to ask the user for the input again.

The major function of the program is of course to provide interrupt handling. This is implemented in the form of the commands: After, Every, Disable, Enable and Drop. The scheme of things is basically this; there is a timer available counting at a rate of 50 units per second — the Frames rate. Using the After command you can set the timer to a specific value. Immediately, the timer starts counting down towards zero. Your program can happily continue, not having to worry about the timer any further. When the counter reaches zero the flow of your main program is temporarily diverted to a certain subroutine; just as if a

(contined on page 150)

New
High Flyers!
from MicroProse Software
C64
ATARI
The action is simulated- The excitement is REAL!
F-15 STRIKE EAGLE
F-15 Strike Eagle features superb 3-D graphics, F-15 manoeuvreability, computer assisted targetting including a modern fighter Heads Up Display, airborne radar, air to air missiles, surface to air missile defence, ground target bombing, full aerobatics, and multiple combat scenarios.
DISK/CASSETTE
£14.95
SPITFIRE ACE
Save London during the Blitz in your Royal Marine Spitfire fighter! Featuring outstanding out-of-the cockpit 3-D graphics, Spitfire Ace provides 14 different combat scenarios and fast paced action. For 1-4 players.
CASSETTE
£9.95
DISK
£12.95
Solo FLIGHT
Grab your joystick and take off with this user friendly flight simulator that is 'All the flying challenge you can handle!' Includes outstanding 3D graphics, full cockpit instrumentation, dual VORs, ILS, 21 different airports, landing, scoring, and real life challenges from weather, instrument and mechanical emergencies.
DISK/CASSETTE
£14.95
No.1 Flight Simulation
NATO COMMANDER
Defend Europe in a heart pounding, accelerated real-time war situation! Use your full continent scrolling battle map to destroy, manoeuvre and command the battle unit, including infantry, armour, helicopters, air forces, and tactical nuclear weapons to stop the ever advancing Warsaw Pact battle units.
CASSETTE
£9.95
DISK
£12.95
THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD
U.S. Gold is stocked by all leading computer stores including:
BOOTS WHSMITH JOHNMENZIES WILDINGS
DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH Telephone: 021-520 7591. Telex: 337268.
Overseas enquiries welcome.
U.S. GOLD
All American Software

(continued from page 148)
Gosub had been magically inserted in the right position in the program.

The subroutine is not terminated by a Return command but by the normally innocuous Continue. The syntax of the After command is After x, Gosub y. The Gosub has to be typed out in full. It is necessary, I'm afraid, to type in the seemingly redundant comma just before the Gosub bit.

The ability for a program to be freely interrupted in this way is often loosely termed Multitasking or parallel processing.

Here's a silly example — a listing for a computerised egg timer.

```
   10 RANDOMIZE USR 63866
   20 REM AFTER 9000,GOSUB 1000
   30 PRINT "Start boiling the egg. I'll just
      brush up on my mental arithmetic."
   40 LET a = INT (RND*1000)
   50 LET b = INT (RND*1000)
   60 PRINT a;" + ";b;" = ";a + b
   70 FOR c = 1 TO 100: NEXT c
   80 POKE 23692,255: REM *Allow
      automatic scrolling
   90 GO TO 40
1000 PRINT "The egg is done"
1010 STOP
```

Line 20 sets up the time delay of 9000 1/50ths of a second — three minutes. Lines 30 to 90 just waste type by doing something completely unrelated with eggs, adding numbers together. Lines 1000 and 1010 are the subroutine called when the three minutes are up. The After command is a "single shot" command in that the subroutine is called only once, after which the timer becomes inactive. In most applications you would want a certain routine to be called at regular intervals. You could do this with the After command if you re-initialised the timer with After at the start of the subroutine.

However, a much better way is to use the Every command. Every is used in exactly the same manner as the After command. When the "interrupt service routine" — the subroutine called when the timer reaches zero — is reached the timer is automatically re-armed to its starting value ready for the next time. This program will constantly update the time at the top left-hand side of the screen even while another program is running:

```
   10 RANDOMIZE USR 63866
   20 LET min = 0: LET sec = 0
   30 REM EVERY 50,GOSUB 9900
   40 LET a = 0
   50 PRINT AT 21,0;a: LET a = a + 1
   60 GO TO 50
9900 LET sec = sec + 1
9910 IF sec>59 THEN LET min = min + 1:
      LET sec = 0
9920 PRINT AT 0,0;("0" AND min<10);min;
     ":";("0" AND sec<10);sec
9930 CONTINUE
```

The delay time in an After or Every command can be up to 65,535 units, about 21 minutes 51 seconds. If you need longer delays than this for some reason then you could use the following method. For instance a delay of one hour could be produced by setting up an interrupt service routine — or ISR if you like abbreviations — called every 10 minutes. At the start of the program you would initialise a variable — a, say — to zero.

Each time the ISR is called the value in a is incremented and when it reaches six, an hour has passed. Bear in mind, however, that the Spectrum's clock isn't very accurate and you could end up with a quite drastic error with such a long delay.

So far I've talked about the "timer" in a singular sense. There are, in fact, eight timers. All eight are completely independent of one another in all respects. You can direct information to specific timers in an Every or After command by tapping another number in after the delay time, e.g.,

```
AFTER 100,7,GOSUB 9000
```

uses timer 7.

The timers are numbered 0 to 7. If you miss the timer number out, as in previous examples, then it defaults to timer 0.

The Disable command enables — no pun intended — you to suspend the operation of one or all of the timers. Disable used on its own disables all eight timers whereas Disable followed by a number disables only that particular timer. The inverse command is Enable which is used in a similar fashion to re-enable previously disabled timers.

```
   10 RANDOMIZE USR 63866
   20 REM AFTER 100,GOSUB 1000
   30 REM DISABLE 0
   40 GO TO 40
1000 PRINT "Time up!"
1010 STOP
```

Does nothing unless you remove the disable statement at line 30 or put in an enable command at line 35. You'd usually use the Disable/Enable commands to protect certain parts of a program from being interrupted, possibly because that part manipulates variables used by the ISR(s) and could leave the variables in temporary states that may upset the ISR(s).

The last command connected with interrupts is Drop. In an analogous way to normal Gosubs, before an ISR is called the current line and statement numbers are stored away on a stack so that normal program execution can continue quite happily when the ISR is finished. In some circumstances, however, you might not want to ever return from the ISR. For example, in a game you might wish to set a time limit to complete a certain task, say 10 seconds. You could use After 500, Gosub 8000 so that when the time is up a jump to line 8000 will be made. Obviously you wouldn't want to return from the ISR to continue that particular part of the game.

To save leaving the stack in an unbalanced state you would use the Drop command. This command simply makes the computer take the top item of its stack and throw it in its electronic dustbin. In an application such as this you can disarm the timer with an After 0, Gosub x as soon as the task's been completed otherwise you could find the computer calling the ISR at a rather inappropriate time.

When a timer counts down to zero the computer remembers that a certain line is to be called by placing its line number on yet another stack. When the statement currently being executed is finished it looks at the number it remembered and calls the appropriate ISR. Because ISR calls are not processed until the current statement is completed Input, Pause, Load, Save, Merge and Beep may hold things up. The computer, being a meticulous beast by nature, carefully piles up all the numbers of the ISR's it's got to call in preparation for such a time when it is able to process them.

Eventually the computer will run out of room and will no longer bother to store the lines. The amount of room the computer has got for stack storage is determined by how much memory you leave free between RAMtop and the start of the program at 63866. A good value for RAMtop is 63000 which leaves room for all but the most complex applications. Using the user-defined function introduced under the On Error command it is possible to interrogate any of the timers and find their current status. Use FN v(x) where x is the timer you wish to look at, numbered 0 to 7.

```
   10 DEF FN v(a) = USR 63872:
      RANDOMIZE USR 63866
   20 REM AFTER 1000,5,GOSUB 4000
   30 PRINT AT 0,0;FN v(5);" "
   40 GO TO 30
1000 STOP
```

The program displays the time remaining on timer 5 as it plunges towards zero. The function will return a zero if the timer is either inactive or disabled.

Unlike error and break handler routines, ISRs will nest to as many levels as you like although in practice the number of levels is determined by the amount of free memory available above RAMtop for the stack. One thing to avoid is to define an Every command with a time interval smaller than the time needed to execute the associated ISR. The routine will "interrupt itself" in such a circumstance as the next interrupt will have occurred before the ISR to handle the previous interrupt is finished.

Eventually the computer will get clogged up with an enormous stack of return lines which it never quite gets round to using. If this sort of situation is a possibility in your program then disable the timer right at the start of the ISR and enable it again right at the end. When writing ISRs, as with break and error handlers, it is important to remember that the routine should not do anything to unduly upset the main program by changing the value of one of the variables it is using, for instance.

The computer looks after you a bit by automatically storing the print and plot positions at the start of the ISR and restoring them to those values when the ISR is terminated. Print and plot positions are therefore "local" to the ISR. If you print and draw from within an ISR then the computer will automatically tidy any damage you might have done by changing the print/plot position.

There are a couple of points of interest to Interface 1 users. First, you should not use Open # and Close # commands in conjunction with this program. More precisely, programs using the interrupt facilities; On Error and On Break etc., don't matter. Secondly, any other Microdrive/Interface 1 commands should be immediately followed by

```
RANDOMIZE USR 63869: POKE 23728,0
```

sequences.

Rem statements typed in as direct commands are treated in the normal way and cannot, therefore, contain any new commands. The Continue statement cannot be used in the normal way as when an error is actually reported (in contrast to an error handler being called) then all the new stacks are cleared and the timers are all forced inactive. Continue will not, then, resume a program without actually clearing or changing anything. ■

THE FINAL TOUCH

We've just added the final touch to our professional keyboard.
This new Microdrive compatible keyboard offers more key functions than any other in its price range. And the stepped keys and space bar make it even easier to use. Our keyboard, constructed from high density black ABS, will take your Spectrum into the professional league.
It has 52 "stepped" keys plus space bar. A separate numeric key pad consisting of 12 red keys including a single entry 'delete' plus single entry 'decimal point', facilitate fast numeric data entry.
The 15" x 9" x 3" case will accommodate your Spectrum and other addons like interface 1, power supply etc. and forms an attractive self-contained unit.
All connections, power, Mic, Ear, T.V., network RS232 and expansion port are accessible at the rear.
A few minutes, a screwdriver and the simple instructions supplied are all you need to fit your Spectrum.
All dktronics products are covered by a comprehensive guarantee.

ONLY £45.00

No Price Increases!

Please rush me the following
..... Microdrive compatible keyboard(s) £45.00
Please add post and packing £1.25
I enclose cheque/PO/Cash for Total £ _____
or debit my Access/Barclaycard No.
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Signature _____ Name _____
Address _____

And it's Available NOW!

dktronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

synsoft presents...
The World's Greatest Games!
Selected Titles available soon for Spectrum
The Unsurpassable Experience
synsoft
ZAXXON
DRELBS
SENTINEL
BLUE MAX
FORT APOCALYPSE
ATARI
Play one of the most challenging arcade games on your C-64 computer. ZAXXON's incredible 3-D graphics, diagonally scrolling screen and super sound are reproduced in great detail. Hang onto your joystick, keep firing and practice. You may eventually encounter the deadly Zaxxon himself!
synsoft
U.S. GOLD
CASSETTE £9.95
DISK £14.95
THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD
U.S. Gold is stocked by all leading computer stores including:
Boots
John Menzies
WHSMITH
WILDINGS
WOOLWORTH
U.S. Gold Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH
Telephone: 021-520 7591. Telex: 337268.

BBC RETRO-FITS

Acorn's new ABC lets you upgrade all the way to a minicomputer — you can't go that far with the BBC but John Dawson tries some packages which take it into the supermicro league.

THE PRODUCTION of massive quantities of add-on or "retro-fit" equipment for the BBC Microcomputer must be having some effect on the unemployment situation in the U.K. For those of you with some money to spend, or the hope that someone else will spend it for you, here is a pre-Christmas selection of hardware and software for the BBC computer. Prices range from less than £15 up to rather more than £120.

It's actually quite difficult to keep up with all the gadgets and programs that are being developed and advertised for the BBC machine. In the course of writing this article I have found a second and third ROM extension cable mentioned in advertisments, several more ROM extension boards, two or three more versions of Forth and so on.

No frustration or disgust

Only a few of the items in this review create any new capabilities for the BBC Micro; you can, after all, save programs on to tape, exchange Eproms using the four sockets in the ordinary machine and process words using any one of a number of programs. What the devices and software discussed here do achieve is an increase in your productivity by saving time, reducing fatigue and errors and encouraging you to concentrate on the task rather than the machine. The gain is so great in some cases that a job becomes possible where before you would have given up in frustration or disgust.

Multi-Forth 83 from Skywave has been written by David Husband who produced an earlier version of the language for the ZX-81. It is impossible to thoroughly test a piece of software like multi-Forth 83 in the course of a couple of weeks. That applies also to both the other chips — Ade and View A2.1 — discussed in this review. It *is* possible to give you some idea of the capabilities of the program and its underlying ideas and any gross faults.

Multi-Forth 83 comes as a 27128 16K Eprom and Skywave says that while it normally operates a return of post service, the worldwide shortage of these chips means that their initial stock is unlikely to last for very long while the price of £40 may have to change to reflect the Eprom supply situation.

A 176-page manual completes the standard package and a demonstration disc holding one program is available to round off a "de luxe" system. The manual contains a comprehensive description of the multi-Forth 83 system although you will need a separate Forth textbook if you are not familiar with the language.

Forth is a Threaded Interpretive Language and it is an intrinsic quality of TILs that they run quickly. Multi-Forth 83 is said to operate 17 times faster than BBC Basic — when it is performing one task. That seems a reasonable claim, particularly when you see the system multi-tasking and still operating quickly.

Normal programs execute a series of program instructions and stop. Multi-tasking allows you to place several complete programs into the computer's memory and the computer is then directed to hop around from one program to another so fast that it looks as though all the programs are running simultaneously.

Multi-Forth 83 will run up to 28 tasks at one time! The demonstration disc shows five tasks operating at once and the screen output is very impressive. If you start a foreground task it is noticeable that some of the others slow down, the screen display of the clock, for example, may only be updated every two seconds, but the overall performance of multi-Forth 83 is stunning.

You can print a listing of a program at the same time that you are doing something with the keyboard, sending commands to a robot via the user port and reading the position of a joystick.

The Forth position

The 1983 standard Forth definition has a lot of useful words in addition to those in the earlier 1979 standard and David Husband has included many BBC-specific commands from the operating system. Words are available also to control Sound, Envelope, Colour and Time. The editor allows the use of the BBC cursor keys as well as the usual single-key Forth commands.

Standard Forth uses integer numbers and multi-Forth 83 keeps to this policy offering 16-bit and 32-bit number-handling words. You can, of course, write your own floating-point words but the integer and fixed-point words in multi-Forth 83 will do very well for most applications.

Multi-Forth 83 will appeal greatly to anyone who is already familiar with the use of Forth; additionally, it should be considered by owners of the BBC computer who wish to start learning about Forth. Multi-Forth 83 does not

(continued on page 157)

MUSIC MICRO PLEASE!!

AVAILABLE FROM ALL LVL DEALERS (FOR FURTHER INFORMATION TELEPHONE 0602 394000).

ECHO I £99.95*
ECHOSOUND £49.95*
ECHOKIT £4.95*

LVL's ECHO I is a high quality 3 octave keyboard of 37 full sized keys operating electronically through gold plated contacts. The keyboard which is directly connected to the user port of the computer does not require an independent power supply unit.

The ECHOSOFT Programme "Organ Master" written for either the BBC Model 'B' or the Commodore 64 supplied with the keyboard allows these computers to be used as real time synthesizers with full control of the sound envelopes. The pitch and duration of the sound envelope can be changed whilst playing, and the programme allows the user to create and allocate his own sounds to four pre-defined keys.

Additional programmes in the ECHOSOFT Series are in the course of preparation and will be released shortly.

Other products in the range available from your LVL Dealer are our:

ECHOKIT (£4.95)* – External Speaker Adaptor Kit, allows your Commodore or BBC Microcomputer to have an external sound output socket allowing the ECHOSOUND Speaker amplifier to be connected.

ECHOSOUND (£49.95)* – A high quality speaker amplifier with a 6" dual cone speaker and a full 6 watt output will fill your room with sound. The sound frequency control allows the tone of the sound output to be changed.

Both of the above have been specifically designed to operate with the ECHO Series keyboard.

The ECHO PRODUCT FAMILY breaks both the SOUND and PRICE BARRIERS, representing outstanding quality and value for money.

* Inclusive of VAT

LVL

Scientific House,
Bridge Street, Sandiacre
Nottingham NG10 5BA
Telephone (0602) 394000

MILES BETTER SOFTWARE

221 Cannock Road, Chadsmoor, Cannock, Staffs WS11 2DD
Tel 05435 3577

US Gold Software	*Cassette*	*Disk*
BEACH HEAD	£ 8.95	£12.00
RAID OVER MOSCOW	£ 8.95	£12.00
STRIP POKER	£ 8.95	£12.00
*FORBIDDEN FOREST	£ 8.95	£12.00
*AZTEC CHALLENGE	£ 8.00	£12.00
*SLINKY	£ 8.00	£12.00
*CAVERNS OF KHAFKA	£ 8.00	£12.00
*POOYAN	£ 9.00	£12.00
*BRUCE LEE	£12.95	£12.95
*DALLAS QUEST	—	£12.95
*O'REILLYS MINE	£ 9.00	£11.00
*SNOKIE	£ 9.00	£11200
*FLAK	—	£12.95
MYSTIC MANSION	£ 8.00	£12.00
*SOLO FLIGHT	£12.95	£12.95
*NATO COMMANDER	£ 9.00	£12.95
*F-15 STRIKE EAGLE	£12.95	£12.95
*SPITFIRE ACE	£ 9.00	£12.95
*FORT APOCALYPSE	£ 9.00	£14.00
*DRELBIS	£ 9.00	£14.00
ZAXXON	£ 9.00	£14.00
SENTINAL	£ 9.00	£14.00
*BLUE MAX	£ 9.00	£14.00

**Available for the Atari*

Phone for software availability and comprehensive software lists

ADULT PARTY GAMES

SPECTRUM 16/48k

STRIP POKER

Classic adult party game for 2-10 players, who may lose a lot more than their stake! Fully featured 5-Card Poker game (basic rules supplied) with that little bit extra!

£6.95 (cassette)

Fully inclusive mail order price

RISQUÉ

New on-screen board game for 2-4 very, very good friends. Revealing after-dinner frolics, fun, dares, risks and forfeits!

£7.95 (cassette)

Fully inclusive mail order price

Send cheque/PO/MO payable to:

PR SOFTWARE
7 Ashley Road, Poole, Dorset BH14 9BS

PRAYBOURNE

FREE! PROTECTIVE DUST COVER WITH EACH BAG... WORTH UP TO £4.95

DRAGON BAG
(Also takes Atari 400, Atari 800XL, Texas T199, Tandy TRS 80 Home Computer). Price £17.50

BBC MODEL B BAG
(Also takes Atari 800). Price £18.95

C64 / VIC 20 BAG
(Also takes Lynx, Acorn Electron, Atari 600XL). Price £14.95

SINCLAIR SPECTRUM BAG
(Also takes Oric, Sinclair ZX 80/81). Price £12.95

All these bags have been carefully designed and sculptered to fit each computer that they were designed for. Some of the bags will also take other computers and these are indicated as those inside the closed brackets.

CASSETTE/DISC DRIVE/ACCESSORY BAG

This bag will take all leads and cables, mains adaptor and plugs. It will carry all cassette and disc drive units available from most leading manufacturers. There are also 2 useful pockets to take any items such as manuals or cassettes that you are unable to squeeze into the large main bag compartment.....an ideal addition to the bags above. Price £14.95

SPECIFICATION

A strong attractive 'sports bag' type material is used inside and out. This is a nylon coated P.V.C. material which is inexpensiv strong and waterproof. It has a wipe clean finish and all bags are available in black or royal blue.
The handles are 1" polypropylene webbing which travel all the way around the bag to give added strength. Quick release non slip nylon buckles allow access to the bag and to pockets to carry disks, manuals, plugs and leads, etc. All bags are padded with a high impact ¼" think foam which protects computers against bangs and bumps which would normally damage the machines.
Most bags have a comfortable non-slip shoulder strap which is fully adjustable and has 'dog clip' fasteners to enable the strap to be removed if so wished. Each bag has a clear P.V.C. window on the inside to allow an address card to be inserted for identification purposes.

We also manufacture padded bags for most home and business computer hardware.

Trade and export enquiries welcome (large discounts available)

All prices are inclusive of V.A.T., postage and packing for U.K. deliveries (overseas add 20%)
PRAYBOURNE LIMITED, UNIT 5, MILLSBOROUGH HOUSE, IPSLEY STREET, REDDITCH, WORCESTERSHIRE. B98 7BU
Redditch (0527) 61221, 61759

I enclose my cheque/postal order: Total.....
Please send me:-.....BAG/S
together with my FREE! dust cover

NAME.....

ADDRESS.....

.....

.....

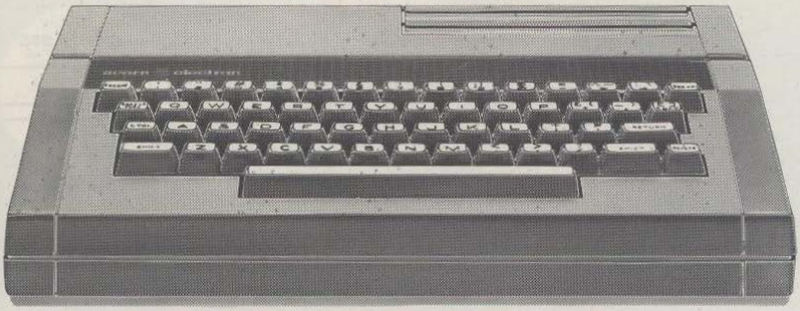
Please allow 14 days for delivery (overseas 28 days)

View ROM Word processor software. Normal price £59.95.

Viewsheet ROM Spreadsheet software. 255 columns by 255 rows. Normal price £59.95.

Games ROM The exciting Arcade game, Hopper. Normal price £14.95.

All you need to mix business with pleasure. For only £299.



Acorn Electron 32K Random Access Memory. With BBC Basic. Normal Price £199.00.
Electron Expansion Box – Plus 1 provides various utility capabilities which include: a Centronics Interface, a Joystick Interface and 2 ROM Sockets. Normal price £59.90.
Acorn Electron Office Package. Items if purchased separately £393.75. **W.H.S. price 299.00.**

The Acorn Electron Office Package at W.H. Smith provides you with an ideal opportunity to combine all the fun of computer games with practical business usage, such as word processing and spreadsheet capability. You can buy this whole package for £299.00. Separately, the same components cost you £393.75. (incl. VAT).

Find this amongst our wide range of carefully selected computer hardware and software available at most W.H. Smith computer departments.

WHSMITH

Subject to availability. Prices correct at time of going to press.

(continued from page 153)
have to be complex to use but it can keep pace with your developing skills for a long time to come.

The Ade chip is made by System of Sheffield. Ade stands for Assembler Debugger Editor and the 16K chip is a complete, assembly language development system for the BBC. While it is possible to use the assembler in BBC Basic as a macro assembler, it is rather clumsy for programs of any length.

If you want to add short sections of machine code to a Basic program to speed up certain critical sections then you do not need the Ade package. If, on the other hand, you want to write a complete program in machine code then the Ade macro assembler and front panel monitor will become trusted tools.

Ade will assemble a source file whose length is limited only by the disc capacity. 29 pseudo-opcodes give you almost all the control and facilities that you might need. One or two of the pseudo-ops that I have used in Merlin — a macro assembler for the Apple II — are absent, but they are esoteric and not really essential facilities.

The editor in Ade is based on a DEC mini-computer editor called Teco. In addition to immediate commands you may set up a deferred command line which can be a very powerful combination of editing commands.

DFS assumed to cost £95
Average 5.25 SS 40T 100K disc £130 200K £170
Phloopy costs £113.85

Discs/tapes	10	20	30	40	50	60
tapes	43.10	86.20	129.30	172.40	215.50	258.60
discs	18.00	36.00	54.00	72.00	90.00	108.00
Phloopy total	156.95	200.05	243.15	286.25	329.35	372.45
5.25 total	243.00	261.00	279.00	297.00	315.00	333.00
5.25 200K	274.00	283.00	292.00	301.00	310.00	319.00
Phloopy advantage against 100K disc	86.05	60.95	35.85	10.75	– 14.35	– 39.45

Table 1.

You can also define an editing macro command which will be performed whenever you press the Copy key. I like the Ade package very much even though I have spent hundreds of hours working with Merlin. The Ade editor works differently to the Merlin program but appears to be at least as powerful and, as System points out, you can use other editors such as Wordwise. I tried to edit one file using View but that was not very successful; I don't yet know why.

The third part of the Ade system is the debugger or front panel monitor and dis-assembler. Unlike many other BBC dis-assemblers, the Ade program produces machine-code listings which can be saved on to disc, loaded into the editor and reassembled after modification. The front panel commands are comprehensive.

One small but very useful feature is that Ade starts with an asterisk and whatever you type on that line is treated as a "star" command. I have always found it tedious to have to press the Shift key and the Asterisk key together before typing the name of the program I want to use and by mounting Ade in the highest priority Eprom socket I can move easily around various programs from Basic to View A2.1, from Commstar to Ade and so on.

The Ade reference manual contains more than 80 pages of concentrated, well laid out information. Altogether very good value for serious assembly language programmers.

Clares' Replica II is supplied on a 40 or 80 track disc and its purpose is to take copies of cassette tape based programs on to the disc with very little fuss or bother. The Replica II program has space for up to 16 programs and neither the programs nor the copying software can be copied from disc to disc.

In other words you are allowed to make a disc copy of a cassette program. When the disc is full you will need to buy another Replica II disc if you wish to copy further programs.

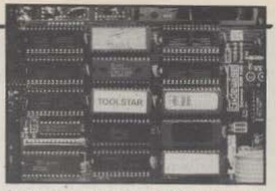
Replica II costs £12 and worked well on my Acornsoft Lisp and Forth tapes as well as my Computer Concepts' Logo. You must be using Basic when you start to run the Replica program; it won't work from any other Eprom. I entered the number of sections in each cassette program and told Replica II that the cassette instructions were to Chain the program.

The transfer to disc proceeded automatically and all the programs I have loaded ran normally. Both Forth and Lisp continued to default to the cassette for file handling. Ordinary games programs caused no problems although Clares is careful to say in the instructions "Whilst Replica II has been made as wide ranging as possible there are and there always will be exceptions".

Copy protected discs and locked tapes make me cross and nervous at the same time. Clares says "Should the disc become corrupted either through a drive fault or incorrect usage Clares will undertake to re-copy the disc for a cost of £1.00 cash . . . If it is found upon investigation that the problem was caused by Replica II we will re-copy and refund your £1.00".

That seems a fair offer. Certainly I am delighted to have the accessory languages that I use from time to time available quickly rather than having to wait interminably while the cassette recorder grinds away. Good value.

The original View word processor was plagued by a number of bugs and never achieved the popular acclaim given to Wordwise. View A2.1 is a new, error-free version, and is a far better word processor than Wordwise for all sorts of reasons. I have been using View for the last couple of weeks and I have no doubt that if you are thinking of spending £46



on Wordwise then you should consider paying the extra £12 for a View A2.1 chip.

If you write professionally, when the productivity you achieve is important to you in terms of money, you will recover the additional cost in a couple of weeks or less.

View A2.1 has more facilities than Wordwise and the full screen editing makes it much easier to use. Twenty-nine formatting and editing commands are available using the red function keys and a further 23 formatting and printer commands can be embedded in the text. Although you will need the printer driver program to make the best use of your printer, there are two highlight commands in View which can be used to send control codes of your choice to a printer.

The Search, Change and Replace commands have powerful wildcard facilities. There are commands — Edit, More, Finish or Quit — to cope with documents longer than the available RAM in the BBC Micro. Working forwards through a text is easy but it is a more complicated matter to transfer a section of text backwards over the boundary between text on the disc and text in the computer.

Nevertheless View does allow you to handle long documents using an 80-column display. Wordstar, a CP/M-based word processor, is easier to use in this respect but costs six times as much as View! In some other ways View is more powerful than Wordstar and has a better ergonomic design.

On top of all the powerful text editing functions, for example, you can type in a list of names and addresses and then merge these automatically into a standard letter.

You cannot select certain categories of people from within a list, but that is no disadvantage for many purposes. View will produce all the footers, headers and two-sided headers that you might need for writing a book and can print one chapter after another from disc or tape without any intervention by you.

I think that the full screen editing is the feature of View that I like most and the one that separates it most clearly from Wordwise. Some Apple word processors costing more than £80 work in the same way that Wordwise does and the effect of the text moving around a cursor fixed on the centre line of the screen can be tiring and confusing.

Professional word processors must be easy to use for prolonged periods and View A2.1 meets this requirement. The View A2.1 instruction manuals are excellently produced and clearly written. One or two things are missing in the manuals. There is, for example, a page layout command called CO — comment — which is mentioned at the back of one manual but explained nowhere.

Despite this minor omission View A2.1 is a new piece of software that now represents better value for money than its more well

(continued on next page)

(continued from previous page)
known competitor.

Toolstar is a chip containing a set of utility programs. Unlike an ordinary machine-code monitor, Toolstar is transparent to the MOS. This means that each of the routines in Toolstar "performs its function with stealth and afterwards leaves no trace of its operation".

Using no Basic program RAM, Toolstar functions can be called from within a high level program and the comprehensive manual lists a complete disc editor program written in Basic and using many Toolstar sub-programs.

You can extend the routines within Toolstar by writing your own code and calling it using the *Extend command. Eight Basic tools can be used to modify, edit or repair Basic programs and there are 10 machine-code commands which make up a formidable set of monitor tools.

Tools for industry

Toolstar has four disc filing system commands which do away with the annoying necessity for a formatting disc by providing Format and Verify functions as well as disc sector Load and Save commands. Good value for money, especially for people working with machine code.

Floppy disc drives for the BBC Microcomputer make up a high proportion of all the disc drives sold in the U.K. Despite the benefits, a floppy disc drive with the associated integrated circuits — floppy disc controller, disc filing system ROM and so on — is an expensive addition to your machine.

Table 1 shows the real costs of the Phloopy system from Phi Mag Systems Ltd compared with a floppy disc drive with the same storage capacity. The table was constructed to show how the initial cost advantage of the Phloopy systems is progressively eroded as you purchase more discs or tapes.

The break-even point occurs at 44 tapes assuming that there is no change in relative prices. However, you should not be put off by the relatively high cost of the tapes as you will have 4.4 Megabytes of programs or data stored away before the floppy disc becomes more economical.

The Phloopy drive differs from the Hobbit and Ultradrive systems which use cassettes of tape wound from one spool to another to store and retrieve information. Instead, the Phloopy uses a continuous loop of tape like the Sinclair Microdrive. However, the Phloopy is unique in that it stores in parallel format on tape.

By storing data eight bits wide with a ninth clock track, the Phloopy system offers a high packing density and short access times. The drive mechanism and data transfer are controlled by an 8049 microprocessor inside the Phloopy case while a 6821 chip acts as the interface to the main computer. Once you have passed a command to the Phloopy microprocessor, *Format, for example, you can get on and do something else with the BBC while the Phloopy carries out the command.

The Phloopy interface is not compatible with the interface for ordinary floppy disc drives. Installation should not be difficult; you are required to insert four components on to the main board while a couple of resistors must be disconnected.

The following new commands are available in the Phloopy "LFS" — Linear Filing System?

*HELP PHLOOPY	*PHLOOPY
*DELETE	*RENAME
*DRIVE	*TITLE
*FORMAT	*UNLOCK
*LOCK	*VERIFY
*INFO	*COPY
*TRANSFER	*anothername

Additionally, all the normal Basic file handling instructions are available. The new commands are a subset of those in the floppy disc filing system but seem adequate for the tape drive.

*Transfer is a new command that will load a program from a normal cassette tape and transfer it automatically to a Phloopy tape. "*another name" means that the system will look for a machine-code file with a matching name and then load and *Run it.

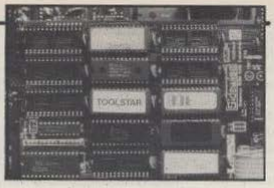
The delay while you wait for the tape to reach the start of your program is certainly longer than you will experience using floppy discs. Conversely, it is far faster to use a Phloopy than it is to store programs on ordinary cassettes. If you have a limited amount of money and reckon that you can cope with transfers of data to and from other computers using the RS-423 port — with the excellent Commstar, for example — then I think the Phloopy tape system could be a very good buy.

The Viglen ROM system makes clever use of the hole in the top cover of the BBC machine just to the left of the keyboard. Designed originally to accept a ROMpack which would load serial data for the speech processor, the hole has been used by Viglen to mount a socket which is connected directly to one of the paged EPROM sockets on the main circuit board.

One immediate advantage of the system is that you need not open the case of the computer to change ROMs but there are other benefits as well. The Viglen ROM extension contains only passive components and uses no power until

CONCLUSIONS

- There is some very sophisticated software available for the BBC Micro at some very competitive prices. The British Broadcasting Corporation's decision to renew their contract with Acorn Computer for another four years will reinforce the strength of the BBC Micro both in the U.K. and in many countries abroad.
- The BBC computer is quite expensive but the initial capital cost is a very good investment if you seriously wish to use your computer for more than one job. If you want to play games only then the BBC machine may give you what you want. If you want to use a computer for word processing, laboratory or instrument control, small scale-number-crunching, teaching normal or handicapped children, communicating with other computers — then the BBC Micro is supreme.
- The additional software and hardware described in this review do add to the BBC Micro's capabilities; whether one or another item will help you or entertain you at a price you can afford is for you to decide.



you plug a cartridge into the socket.

Consequently, you will have more power to use for other purposes from the internal power supply and less heat inside the machine's case. If you need to transfer a ROM or Eprom from one machine to another, in a classroom, for example, the Viglen system could be very attractive.

Equally, if you want to install a special board inside the case of the BBC Micro you may find that it won't fit alongside an ordinary expansion ROM board.

A set of five empty cartridges will cost you over £27 in addition to the £19.95 for the original cable. Other single ROM extension cables are becoming available using zero-insertion force sockets to hold the EPROM.

Only you will be able to judge the relative merits for your own needs — certainly the Viglen ROM system works well and does offer good physical protection to your — expensive — paged ROMs.

There are a number of ROM extension boards made for the BBC Micro; most of them will work satisfactorily in an unexpanded machine. Whether or not a board will operate with one of the second processors or with one of the numerous double-density disc filing systems is another matter. Ideally you should see the ROM board installed and working in your machine before paying for it. Having said that, the ATPL Sidewise board from Advanced Technology Products has a good reputation.

The ATPL board expands the paged ROM facility of the BBC Micro from the original four sockets to the full 16 supported by the operating system. Links can be made or cut to allow you to install either 8K or 16K ROMs or Eproms in the first 10 sockets; another link permits the use of 4K 2732 chips in the first three sockets.

The 15th socket is split into two and may be filled either by 8/16K ROMs or by two 8K CMOS RAM chips. The Sidewise board contains the circuitry to provide battery back-up for the CMOS RAM — a kit can be obtained from ATPL to upgrade the board. The CMOS RAM chips can be write protected and, with the additional battery, can then act like read only memory.

There are 10 integrated circuits on the ATPL board apart from the Eproms and these are all small chips that will draw comparatively little power from the computer's power supply.

The installation instructions are not difficult to understand or carry out except that you must be careful of two power supply connectors on some later issue machines. No soldered connections are necessary; the Sidewise board simply plugs into two IC sockets — the displaced chips fit into the extension board.

My ATPL board works perfectly in my otherwise standard BBC Micro. It saves time and provides a permanent housing for the Eprom programs that I have collected.

Sheer Elegance

SAGA 1 EMPEROR

THE KEYBOARD FOR ZX SPECTRUM COMPUTERS

AVAILABLE NOW

- **EASY FITTING**
- **PLEASURE TO USE**
- **LONG LASTING**
- **SELLING FAST**

Saga 1 Emperor, equipped with 67 keys, has been carefully designed to incorporate the prime keyboard functions of the ZX Spectrum personal computer.

The style is easy: — for your benefit, the SAGA 1 Emperor Keyboard and housing retains the rear expansion dimensions and accessibility for compatibility with all Sinclair's own peripherals including interfaces and microdrive 1 and most other add-ons . . . including ours!

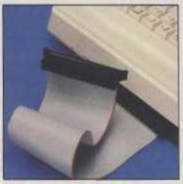
Not only this but we have ensured that the assembly of the keyboard is simple — and fast. No soldering is required, so that within just 5 minutes you can replace your current ZX Spectrum keyboard with the new SAGA 1 Emperor.

AND ALL THIS FOR JUST £54.95 (inc. VAT)

SOUNDBOOST

Hear that keyboard click . . . with a SAGA SOUNDBOOST
Your Spectrum's sound could be continuously adjustable from a whisper to a roar through your television. With our soundboost, no modifications need be made — just three easy push on connections. Supplied built and tested to fit in minutes with no previous experience required; we send full instructions for immediate use. Yours for Only **£9.49**

FLEXICABLE



Developed to relieve your Spectrum from the pressures of life. This neat 9 inch FLEXICABLE comes with two connectors which fit your Spectrum and your add-ons — taking the load with ease. Only **£9.49**

DEALERS CONTACT CAROL MOTE ON WOKING 69527
These products are obtainable through stockists both in the U.K. and abroad, or call us and we will deliver direct — our products are available ex-stock.
Stop press just released, two NEW products added to our range:
1 — latest top quality dust covers available just £4.95
2 — Saga PC! — your very own carry case! — fits everything — keyboard, data recorder etc — Customise — further details and spec sheet available on request.

Please write to: SAGA Systems Limited
Woodham Road, Woking, Surrey
Telephone Woking (04862) 69527/22922
or Telex 859298
all prices include VAT
P&P free for Sound Boost and Flexicable.
P&P £1.25 for SAGA 1 Emperor U.K.
£4.00 for SAGA 1 Emperor Europe

Please send me

Name . . . . . .

Address . . . . . .

. . . . . .

The following SAGA PRODUCTS

. . . . . .

Please make CHEQUES/P.O. Payable to SAGA Systems Ltd.

SSL

MICROPOWERMICROPOWERM
A FANTASTIC NEW PROGRAM FROM BRITAIN'S LEADING SOFTWARE HOUSE
SUPER-FAST LOADING TIME
commodore 64
electron
B.B.C. MICRO
STOCK CAR
Skid round hairpin bends, cutting up the competition and rebounding off the barriers. A one or two player racing game featuring 6 different circuits, oil patches, selectable number of laps and variable skid.
COMMODORE 64 VERSION
£6.95 (BBC version £7.95)
BBC and Commodore Disk price £9.95
WATCH OUT FOR OUR NEW PACKAGING AND CATALOGUE
MICRO POWER
MICRO POWER LTD., NORTHWOOD HOUSE, NORTH STREET, LEEDS LS7 2AA TEL: (0532) 458800
SELECTIVE BRANCHES OF BOOTS, CO-OP, MENZIES, W. H. SMITH, WOOLWORTHS AND ALL GOOD DEALERS.
AUTHORS! WE PAY 20% ROYALTIES!

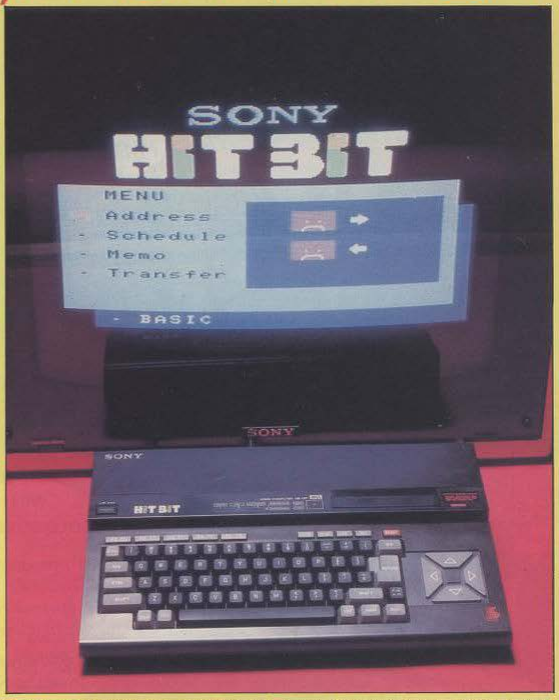
SONY MSX HIT BIT

Competition

RULES

- The winner of the competition will be the person who numbers the Hit Bit's features correctly and, in the view of the Editor, comes up with the best idea and name for an original peripheral for the Hit Bit.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in November 1984.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employee of Business Press International or their relatives may enter the competition.
- The decision of the Editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

At last the Japanese invasion has hit the British shores. Win a 64K MSX micro — see the Sony review on page 62.



WIN THE NEW SONY COMPUTER

Put a 1 against your favourite feature of the Sony MSX Hit Bit, a 2 against your second favourite and so on until you have filled all the boxes. The whole point of MSX is supposed to be compatibility and the ability to interface your computer to other household goods and systems like the video or the hi-fi. We want you to think up a really original idea for what you could connect to a Hit Bit and what you would use it for. Invent a catchy Sony-style name for your unusual peripheral — Walkman, Hit Bit, Trinitron — you know the sort of thing. Then send this coupon to *Your Computer* Sony Hit Bit Competition, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

- ☐ Powerful MSX Basic
- ☐ Built-in electronic diary, address book and memo pad
- ☐ MSX software compatibility
- ☐ Professional keyboard
- ☐ Nifty Sony styling

What would you connect to your Hit Bit? _____

What would you use it for? _____

What would you call it? _____

Name _____

Address _____

POWERSOFTWARE IS HERE...

TEN GOLD SOVEREIGNS MUST BE WON!

CAT WALK
Ever wished you were a cat ? ... Then unhinge yourself with this bizarre new game for 48K Spectrum

BILLY BLUEBOTTLE
An amazingly original multi level arcade type game for 48k Spectrum

ELECTRON JOYSTICK INTERFACE
Simply the best on the market

"WIN"
A GOLD SOVEREIGN

special introductory offer
you may find
a gold sovereign
in one of these games

10 gold sovereigns
must be won

POWER SOFTWARE

FRANTIC FINGERS
A games cartridge for the B.B.C. Micro

BOUNCING BERTY / ESKIMO CAPERS
Introducing our popular high score budget series for 16/48K Spectrum

Interrupting all games programmers
... " Send us your Games !! "

Available from all red hot dealers or Powersoftware.
Thinking about moving home because my local dealer's useless do
Powersoftware, 12 Hadley Road, Stourbridge, West Midlands DY8 1PS
Cheques or Postal Orders made payable to Powersoftware.

Billy Bluebottle	£ 5.95
Cat Walk	£ 5.95
Electron Joystick Interface	£24.95
Frantic Fingers	£ 3.99
Bouncing Berty / Eskimo Capers	£ 3.50
Cheque/Postal Order Total Value	£

Gold Orders to

Name .....

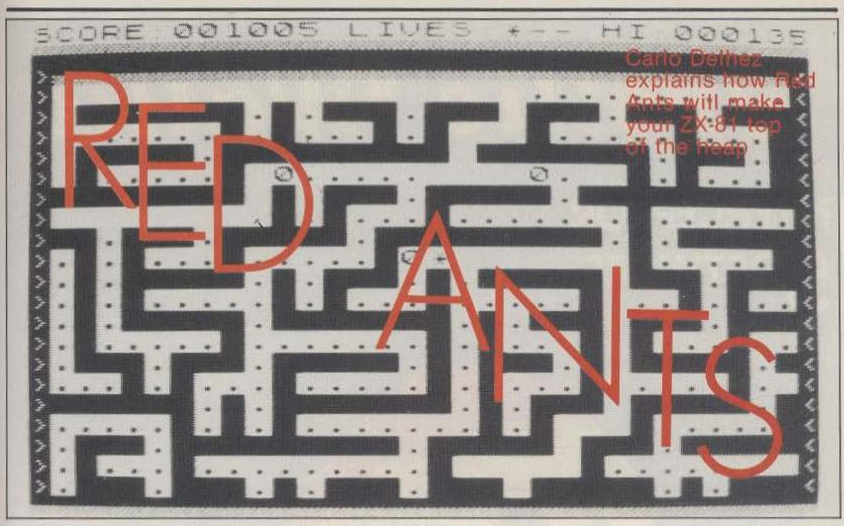
Address .....

Block Capi

Delivery 30 days.

Reg. in England No. 1370

*Cat Walk, Billy Bluebottle, Bouncing Berty, Eskimo Capers, incorporate English, French, & German instructions.



RED ANTS

Carlo Delhez explains how Red Ants will make your ZX-81 top of the heap

THIS GAME MAKES full use of the capabilities of your ZX-81: it consumes the entire 16K RAM and gives fast, smooth and impressive action-graphics during the play.

The game is set in an enormous ants'-nest, measuring more than eleven times the size of the screen. The top of the maze is a long corridor — at ground level — from which lots of galleries are dug into the earth, all coming to a dead end sooner or later after being split up several times. The ants'-nest maze has no exit. Each time you start a new game, a new nest will be "dug"; this takes some five seconds.

Sixteen ants walk through the nest while laying their eggs. It's your mission to collect as many eggs as possible, while watching out for these awful ants: they do not chase you, but as the game progresses they run faster and faster, which makes avoiding them increasingly difficult.

You need imagination, patience, quick reactions, persistence and, of course, a supply of luck to play this game. But these abilities are also needed when entering the program. So, brace yourself!

The program consists of 3355 bytes machine code, stored in one large Rem, and 1786 bytes Basic. The rest of the RAM will be filled by variables.

Entering the machine code is the toughest part. First, clear your ZX-81 by typing:

```
RAND USR 0
```

Second, space needs to be reserved for the machine code. Enter a line 1 Rem followed by 128 characters — i.e., four full lines. Then, edit this line 23 times to get lines 2 up to 24 inclusive. Finally, edit line 24, change to 25 and add five characters. By now 3355 bytes should be reserved. Verify this by:

```
PRINT PEEK 16396 + 256*PEEK
16397 – 16509
```

If a number other than 3355 is printed, you must start all over again.

Third, enter the hex-loader — program 1. Before running the hex-loader, enter subjoined Pokes as direct commands.

```
POKE 16510,0
POKE 16511,23
POKE 16512,13
POKE 16514,118
POKE 16515,118
```

These Pokes will convert the 25 Rem lines to one large Rem statement, stored in line 0. List will only show:

```
0 REM
```

List 1 will show the rest of the program. Now Run the hex-loader.

It expects two inputs — the start address and the finish address. Enter 16514 for the start. If you intend to type in the entire program in one go enter 19863. But if you prefer to type it in over several sessions enter a lower figure; save the code you have already typed and when you resume typing start up where you finished previously.

- Enter Code; Press E. Type the starting-address in decimal. Now you can enter a string of hexadecimal numbers. If the program finds anything wrong in this input, the screen will be cleared, the address where things went wrong is displayed, and a new input asked. Enter a single Q to quit and return to the main menu.
- Check Code; Press C. Enter the starting-address in decimal. The screen will then be filled with the hexadecimal address-contents from this address onwards. Pressing Q during the printing or after a screen-fill will return to the main menu. Pressing any other key after a screen-fill will show the contents of the next 168 addresses.
- Save Code; Press S. The program will be Saved. It is best to repeat this several times while entering the code, in case the final version won't Load properly.

If everything has been entered correctly, delete the hex-loader and make a few tape-copies of the code. When you have reached this stage, you are very near the finish. Just a little more patience . . .

The final stage is to enter a small Basic-program. Don't make mistakes, especially don't be mistaken with addresses preceded by USR and Poke.

You will find that space-saving-techniques, like the use of Val, have been applied. These are really necessary, so do not omit them or the program won't run properly.

By now, you have reached the end. First Save the program by:

```
SAVE "RA*BACK-UP"
```

and then

```
RUN
```

The program will be Saved once again and then . . . the long awaited result. If now, or at any other stage later on, a crash occurs reload the program containing both the complete Rem with machine code and the hex-loader, and re-check the code. If you cannot find an error, reload the back-up copy by

```
LOAD "RA*BACK-UP"
```

and check the Basic-program in which you should find the error.

Let's hope you did not come across a crash. Press Y to get instructions. Read them carefully. If you think the instructions scroll up too fast or too slow, break out directly after the instructions, when "press any key" occurs, and change the number Poked in line 110. A number higher than 160 will make them go slower, a number less than 160 will speed them up. Run again by

```
RUN 10
```

If you have read the instructions, you are asked to press a key after which the starting-temperature can be adjusted. To do this, press 8 to increase or 5 to decrease the temperature. If the correct temperature has been gained,

(Continued on page 165)

Trollie Wallie

INTERCEPTOR SOFTWARE

ONLY
£7.00
ON CASSETTE
£9.00
ON DISK

SUITABLE FOR THE
commodore 64

AVAILABLE NOW
FROM
ALL GOOD COMPUTER
RETAILERS

INTERCEPTOR MICRO'S
LONDON HOUSE, THE GREEN, TADLEY, HAMPSHIRE
TELEPHONE (07356) 71145, 3711

(Continued from page 163)

press Newline. A temperature of less than 22 degrees makes the ants move slower than you, at 22 degrees, they move at the same speed as you, and a temperature of more than 22 degrees will make them move faster than you do. At 30 degrees, the game is hardly playable. You'd better start with 0 degrees.

When the temperature has been adjusted, a message appears to say the game will start within five seconds. During this period, the ants-nest is "dug". It's advisable to press the F-key during this period and to keep it pressed. For when the game starts, there will be no action at all until you release the key. So, keep F pressed.

Now you will see the ants'-nest. Three quarters of the screen is blank: this is the outside of the maze. One quarter, in the bottom right-hand corner, shows a maze. In the top left-hand corner of this maze — the middle of the screen — you see an asterisk. That's you. A few lines underneath you, there's a nought; that's an ant. Take your finger off the key for a short moment; the ant will move and leave full stops behind it. These are the eggs. Now you can release the F-key and start walking. Use the keys: I = up; Z = left; C = right; M = down.

Begin by pressing C for some moments. You will see that you keep steady, while the maze moves to the left.

When you eat the first egg, you will see some bars running across the screen. This also happens every 1000 points. The ants will then speed up.

If you get bitten, you'll see this three times in succession and you will be repositioned in the top left-hand corner of the maze. The ants will then slow down.

After being bitten three times, a nice "Game Over" appears. Press any key to start all over again.

Finally, here are a few useful hints concerning some possible alterations.

If you do not like the key combinations for steering, or there is a need for other keys in order to use a certain joy-stick, you can easily alter the keys for movement. This is done as follows:

```
POKE 18664  )
            )
POKE 18712  > ,Code of character Up
            )
POKE 19834  )
POKE 18669  )
POKE 19852  )
POKE 18681  )
            > ,Code of character Right
POKE 19825  )
POKE 18695  )
            > ,Code of character Down
POKE 19843  )
POKE 19852  )
            > ,Code of character Left
POKE 18681  )
```

Hex loader.

```
 99 REM HEX LOADER
100 PRINT "START ADDRESS"
110 INPUT S
120 PRINT "FINISH ADDRESS"
130 INPUT F
140 FOR N=S TO F STEP 8
150 LET T=0
160 PRINT N; " - ";
170 INPUT A$
180 PRINT A$;" = ";
190 INPUT TOT
200 PRINT TOT
210 LET Z=0
220 FOR K=1 TO LEN A$ STEP 2
230 LET C=CODE A$(K)-28)*16+CO
DE A$(K+1)-28
240 LET T=T+C
250 POKE N+Z,C
260 LET Z=Z+1
270 NEXT K
280 IF TOT=T THEN GO TO 310
290 PRINT "ERROR - PLEASE INPUT
AGAIN"
300 GO TO 150
310 NEXT N
```

Not only has the steering been changed by these Pokes, but the instructions have also been altered accordingly.

The hi-score is stored at the addresses 17046 up to 17051 inclusive. You can Poke in some hi-score or reset it to zero. Resetting to zero, however, can just as well be done by reloading the program.

If you are satisfied with the program, and you do not want to change it any more, it can be made break-proof. This means that, if you try to break while the computer executes a Basic-line, this interrupt-driven routine will respond with the execution of a RST 0, i.e., a full system-reset. To achieve this, edit line 10 and change the Peek into USR. Now Run, record on tape and try to press Break. There will not be much program left if the cursor reappears. This is a very good protection against burglary.

I am fully aware of the fact that typing this program is anything but a pleasant occupation. Therefore, I can supply you with a good-quality tape version. To obtain such a tape, send £3 to Carlo Delhez, Emmastraat 3, 4651 BV Steenbergen, Holland.

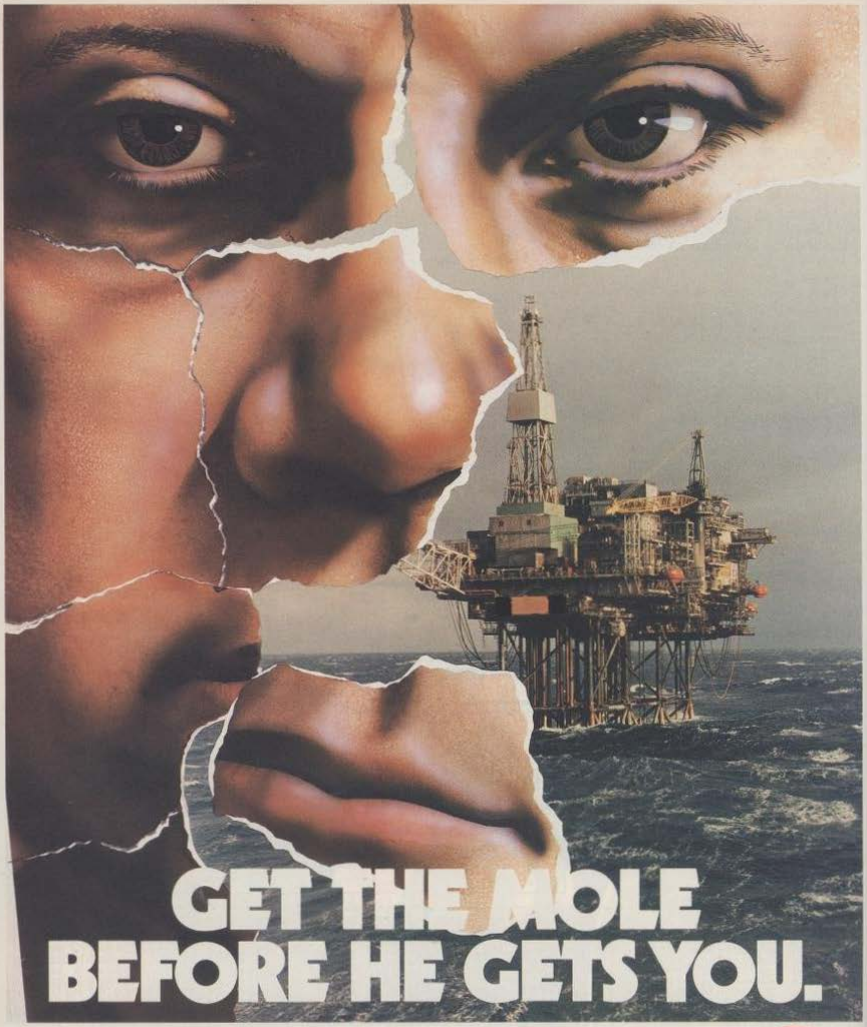
Basic program.

```
  6 REM ((5127TAN,GOSUB 7**(V PR
INT LN 9*V, AND RETURN COPY CODE
  LN 9*V,A*V,A*V,A*V,A*V
  7 REM RETURN C4( *2PI RETURN
  I4$V*V*Z*V RETURN M4$V*V*2PI RETU
RN 17*V*V*V*V*V*V*V*V*V*V*V*V*V*V
  9 SAVE "RED ANTS"
 10 LET O=PEEK VAL "19780"
 11 LET Z$=[redacted]"RED ANTS"[redacted]HAS
 BEEN LOADED [redacted]SUCCESS
FULLY[redacted]
 12 RAND
 13 POKE VAL "18418",SIN PI
 20 LET O=USR VAL "17338"
 40 PRINT AT VAL "7",SIN PI,Z$
 50 PRINT AT VAL "2",Z$,"
C) J.DELHEZ 1984"
 60 PRINT AT VAL "18",
 [redacted]AT VAL "15",
VAL "6","PRESS ANY KEY TO"AT
VAL "8",VAL "9","GET INSTRUCTI
ONS"AT VAL "15",VAL "6"
 [redacted]
 80 PRINT AT VAL "2","PRESS "
N" TO SKIP OVER THEM"
 85 POKE VAL "17554",VAL "2"
 90 LET NO=VAL "18"
 95 POKE VAL "19758"
 98 LET O=USR VAL "17428"
 100 RAND
 102 LET O0=PEEK "61312" THEN GOTO
VAL "140"
 110 POKE VAL "18226",VAL "160"
 120 LET O=USR VAL "18157"
 125 DIM L$(VAL "30")
 128 PRINT AT VAL "22",PI/PI;"
 [redacted]PRESS ANY KEY"
 130 IF INKEY$="" THEN GOTO 130
 132 PRINT AT VAL "22",L$
 135 LET NO=VAL "21"
 136 GOSUB 500
 140 PRINT AT 10,1;"ADJUST THE I
NITIAL TEMPERATURE [redacted]0 = A BORING
GAME; 30 = A HARD [redacted]GAME. USE KE
YS 5 AND N."
 150 PRINT AT 16,8;"
[redacted]";AT 15,8;"[redacted]DEGREES [redacted]";AT
17,8;"[redacted]"
 160 PRINT AT VAL "16",VAL "10";
"00"
 170 POKE 17104,VAL "54,5*USR 19
683"
 175 LET O=USR VAL "17428"
 180 LET NO=VAL "12"
 190 GOSUB 500
 200 LET A$=[redacted]
[redacted]
 210 PRINT AT 10,1;A$;TO 30;AT
12,1;"THE GAME WILL BE STARTED";
AT 14,1;"WITHIN A MOMENT";AT 15
,1;A$;TO 30
 215 LET O=USR VAL "17428"
 220 CLEAR
 225 POKE VAL "17554",PI/PI
 230 DIM B$(VAL "164")
 240 POKE VAL "18514",
 250 POKE VAL "19757",VAL "408+PEEK 19
763"
 260 LET O=USR VAL "19756"
 270 POKE VAL "19757",VAL "408+PEEK 19
763"
 280 LET O=USR VAL "17720"
 290 LET NO=VAL "22"
 300 GOSUB 500
 305 CLEAR
 308 LET Z$=[redacted]
[redacted]
ATH"$ AN [redacted]"RED ANTS"[redacted]
AZE-GAME. [redacted]ADDICTIVE.N
[redacted]
 310 GOTO VAL "30"
 500 POKE 18224,201
 510 FOR K=1 TO NO
 520 LET O=USR 18188
 530 NEXT K
 540 POKE 18224,1
 550 RETURN
```

Hex dump.

```
16511: 7676CDE7433E80CD = 1134
16522: D040E51624EE5CD1 = 908
16530: B5401528B5CDC340 = 775
16538: 18F63E8E1E5CDB5 = 1307
16546: 400645771164D019 = 400
16554: 7723107710CDE540 = 895
16562: C3EB40D577231D20 = 922
16570: FBD1098B7B40C38E = 1187
16578: 410535B02910280B = 573
16586: 3500231D23FE1C19 = 804
16594: E52A0C4011420019 = 455
16602: EBE1C92A10401170 = 924
16610: 1A19C9D10998FFFF = 896
16618: FFE1013223116600 = 885
16626: 19FD382100FD3521 = 704
16634: 2C2F9A324B573EFD = 780
16642: 77368187FD8634FD = 1126
16650: 7732D60330FCED44 = 991
16658: 3D37E521E5401800 = 773
16666: 5F19E8235EE1EB19 = 820
16674: 7EEBFE6020CF3E00 = 1044
16682: 1223230D20C30E32 = 392
16690: 10EBCD9C4ECDDD40 = 1120
16698: 1E65EE9D5CDB540 = 993
16706: 11391B19D13CCDB5 = 781
16714: 402A10401IE20419 = 458
16722: 2278403617E5CDBA = 918
16730: 43E10600287E04FE = 726
16738: 3820F9383FE0383E = 926
16746: 0A2A0C4022B4E0D3 = 623
16754: 47E04211B0D3ED52 = 854
16762: CDD2403E15FEE83E = 1098
16770: 0F9A4577A3211ED0 = 459
16778: 40FB13FD4E21CEFF = 725
16786: 80ED403D20FFE113 = 1110
16794: 01650009FD4E21F1 = 716
16802: 3D20D0C3A1E2B7B = 785
16810: 4000D23FE4F5E53 = 625
16818: 20F97BE0F3037FD = 1026
16826: 77E12F7B40119D03 = 557
16834: 4A0D0D20E5CD2A40 = 992
16842: 13130E1081E5EDA0 = 823
16850: 033D20FAE116FE93 = 998
16858: 2805AF1E3F5E13 = 548
16866: 1E1E5001901FD7E = 944
16874: 2110DDC31342A7B = 715
16882: 4012BC03BAED5ACD = 933
16890: 4E1E1E5E13E5E0E = 592
16898: 1EEDA0030D20FAE1 = 950
16906: 13D51165001D110 = 600
16914: EB0E0E5DD1843C1 = 933
16922: 0F5D2E5E14CA = 965
16930: BD40444DCDBD077E = 925
16938: FE262201C9FE2B28 = 863
16946: E9C3704DBD40FE25 = 1161
16954: D2BD40D621B7216A = 984
16962: 424F0600095E2B56 = 378
16970: 7A1D40D3E1E5E5E5 = 658
16978: 1B280FE1CCAC444 = 834
16986: FE00C2BD40C35241 = 1043
16994: E5CDA844E1C38241 = 1232
17002: FFFE8009BFF0100 = 1022
17010: C9010009FFFFFF65 = 1223
17018: 00C9382034372B0E = 460
17026: 1C1C1C1C1C1C1C01 = 217
17034: 2E3B2A38E1717 = 286
17042: 00D2E0E1C1C1C1C = 217
17050: 1C1CCDDD40015004 = 639
17058: 09D61011E5A4E53 = 647
17065: 1643EB1AFE002803 = 547
17074: 1318F63E1C1327323 = 549
17082: 02233602233600223 = 325
17090: 0EA5130020FC10E3 = 738
17098: 3E10321543E0632 = 334
17105: 1442C9335E001004 = 583
17114: 6098FF1A618FFBF = 1230
17122: 619BFFCB2010D6F = 919
17130: 630100196410001 = 419
17138: 640100E575010000 = 218
17146: 550100E5501005E = 469
17154: 670100016801008 = 381
```

(Continued on page 167)



Available for B.B.C. Model "B", Electron, Spectrum and Commodore 64. Espionage is available from all leading High Street Stores and quality Computer Games Specialists.

price **£8.95**

Retailers contact Mr. Len Fisher on our telephone hot-line (0642) 227223.

Espionage

MODULAR RESOURCES LIMITED MR

A GAME OF INTRIGUE & SKILL IN THE OIL BUSINESS.

(Continued from page 165)

```
17582: 8801005559010FFA = 546
17590: 8901000BFD1A0A16 = 483
17598: 8A1A0000FD0000FF = 510
17606: 8B0000FFFD0000FF = 511
17614: 8C0000FFFD0000FF = 1062
17622: 4D01A1A17FFE17CA = 1115
17630: 8E0000FF0D0000FD = 511
17638: 8F0000FFFD0000FD = 510
17646: 9000FFFD0000FD0A = 800
17654: 9101A1A17FFE17CA = 971
17662: 9200FFFD0000FD0A = 800
17670: 9300FFFD0000FD0A = 819
17678: 9400FFFD0000FD0A = 1066
17686: 9500FFFD0000FD0A = 800
17694: 9600FFFD0000FD0A = 800
17702: 9700FFFD0000FD0A = 800
17710: 9800FFFD0000FD0A = 800
17718: 9900FFFD0000FD0A = 800
17726: 9A00FFFD0000FD0A = 800
17734: 9B00FFFD0000FD0A = 800
17742: 9C00FFFD0000FD0A = 800
17750: 9D00FFFD0000FD0A = 800
17758: 9E00FFFD0000FD0A = 800
17766: 9F00FFFD0000FD0A = 800
17774: A000FFFD0000FD0A = 800
17782: A101A1A17FFE17CA = 1115
17790: A200FFFD0000FD0A = 800
17798: A300FFFD0000FD0A = 800
17806: A400FFFD0000FD0A = 800
17814: A500FFFD0000FD0A = 800
17822: A600FFFD0000FD0A = 800
17830: A700FFFD0000FD0A = 800
17838: A800FFFD0000FD0A = 800
17846: A900FFFD0000FD0A = 800
17854: AA00FFFD0000FD0A = 800
17862: AB00FFFD0000FD0A = 800
17870: AC00FFFD0000FD0A = 800
17878: AD00FFFD0000FD0A = 800
17886: AE00FFFD0000FD0A = 800
17894: AF00FFFD0000FD0A = 800
17902: B000FFFD0000FD0A = 800
17910: B101A1A17FFE17CA = 1115
17918: B200FFFD0000FD0A = 800
17926: B300FFFD0000FD0A = 800
17934: B400FFFD0000FD0A = 800
17942: B500FFFD0000FD0A = 800
17950: B600FFFD0000FD0A = 800
17958: B700FFFD0000FD0A = 800
17966: B800FFFD0000FD0A = 800
17974: B900FFFD0000FD0A = 800
17982: BA00FFFD0000FD0A = 800
17990: BB00FFFD0000FD0A = 800
17998: BC00FFFD0000FD0A = 800
18006: BD00FFFD0000FD0A = 800
18014: BE00FFFD0000FD0A = 800
18022: BF00FFFD0000FD0A = 800
18030: C000FFFD0000FD0A = 800
18038: C101A1A17FFE17CA = 1115
18046: C200FFFD0000FD0A = 800
18054: C300FFFD0000FD0A = 800
18062: C400FFFD0000FD0A = 800
18070: C500FFFD0000FD0A = 800
18078: C600FFFD0000FD0A = 800
18086: C700FFFD0000FD0A = 800
18094: C800FFFD0000FD0A = 800
18102: C900FFFD0000FD0A = 800
18110: CA00FFFD0000FD0A = 800
18118: CB00FFFD0000FD0A = 800
18126: CC00FFFD0000FD0A = 800
18134: CD00FFFD0000FD0A = 800
18142: CE00FFFD0000FD0A = 800
18150: CF00FFFD0000FD0A = 800
18158: D000FFFD0000FD0A = 800
18166: D101A1A17FFE17CA = 1115
18174: D200FFFD0000FD0A = 800
18182: D300FFFD0000FD0A = 800
18190: D400FFFD0000FD0A = 800
18198: D500FFFD0000FD0A = 800
18206: D600FFFD0000FD0A = 800
18214: D700FFFD0000FD0A = 800
18222: D800FFFD0000FD0A = 800
18230: D900FFFD0000FD0A = 800
18238: DA00FFFD0000FD0A = 800
18246: DB00FFFD0000FD0A = 800
18254: DC00FFFD0000FD0A = 800
18262: DD00FFFD0000FD0A = 800
18270: DE00FFFD0000FD0A = 800
18278: DF00FFFD0000FD0A = 800
18286: E000FFFD0000FD0A = 800
18294: E101A1A17FFE17CA = 1115
18302: E200FFFD0000FD0A = 800
18310: E300FFFD0000FD0A = 800
18318: E400FFFD0000FD0A = 800
18326: E500FFFD0000FD0A = 800
18334: E600FFFD0000FD0A = 800
18342: E700FFFD0000FD0A = 800
18350: E800FFFD0000FD0A = 800
18358: E900FFFD0000FD0A = 800
18366: EA00FFFD0000FD0A = 800
18374: EB00FFFD0000FD0A = 800
18382: EC00FFFD0000FD0A = 800
18390: ED00FFFD0000FD0A = 800
18398: EE00FFFD0000FD0A = 800
18406: EF00FFFD0000FD0A = 800
18414: F000FFFD0000FD0A = 800
18422: F101A1A17FFE17CA = 1115
18430: F200FFFD0000FD0A = 800
18438: F300FFFD0000FD0A = 800
18446: F400FFFD0000FD0A = 800
18454: F500FFFD0000FD0A = 800
18462: F600FFFD0000FD0A = 800
18470: F700FFFD0000FD0A = 800
18478: F800FFFD0000FD0A = 800
18486: F900FFFD0000FD0A = 800
18494: FA00FFFD0000FD0A = 800
18502: FB00FFFD0000FD0A = 800
18510: FC00FFFD0000FD0A = 800
18518: FD00FFFD0000FD0A = 800
18526: FE00FFFD0000FD0A = 800
18534: FF00FFFD0000FD0A = 800
17602: 18F07703FE43C1D1 = 1301
17610: 1A0144C01A4C0F1F = 317
17618: 4A21C4A2D0021115 = 433
17626: 001978FE17B0708B = 518
17634: 1D8B8C01D4533D9A = 709
17642: 1A4A0C3214422475 = 448
17650: 4D3600CCDD4D1E66 = 727
17658: 001903584121704E = 590
17666: 1D0E0191FE111400 = 314
17674: 1B0180B0B0C9CDFF = 1142
17682: 441A4E8B0380E004 = 459
17690: 8C8B1A7BCDBA43C9 = 974
17698: 8C8B1A7BC8E21C0D = 1010
17706: FA19F4C3327A7600 = 1010
17714: 02B101FF7670EE8B = 685
17722: 0A0B1A1A1A0B1A1A = 457
17730: 1A1E3B0E2210FBE1 = 451
17738: 0C8B01121001BFE8 = 370
17746: 2B0C4E2E44D01921 = 645
17754: 1A1A1A1A4F0D0021 = 554
17762: 131A0E7F2004773D = 557
17770: 1B0F8FCD2B04C8B3 = 1158
17778: 8B8A1E1A1BFFFD00 = 1007
17786: 0B0A1E1D0B18CCCD = 498
17794: 8B0A2C25FAC9B604 = 734
17802: 4A87C0C8E4A4E546 = 690
17810: 0B0D0A4A0D7A8B9D = 424
17818: 0B0D0A4A87014B05 = 289
17826: 8B0D0A4A2B3338CD = 606
17834: 0D0A0A4A0D8B3B0D = 342
17842: 4B8B3D1D0B0D4CCD = 555
17850: 0B8B0A2B0B0D0B8B = 344
17858: 4A87D0C4A3B7D8B5 = 483
17866: 1D0A0B4A1B7D2B8B = 483
17874: 0D0A4A0B0D2A1B8B = 488
17882: 8D0A1B0B0D4CD0B7 = 491
17890: 0A1B0D0A4B7B7D1 = 347
17898: 4A2B7D4A0B4B7B7D1 = 494
17906: 0B0B4A87B6D2B1B6 = 583
17914: 0A4A1B0B4A3B0B0D4 = 490
17922: 4A0B0B0B0B0B0B0B = 559
17930: 0B0B0B0B1A1B7B741 = 419
17938: 0B0B0B4A8B2B3B0CD = 418
17946: 0B0B0B4A8B2B3B0CD = 418
17954: 0B7D1A8B0B0B0B0B = 416
17962: 0B0B4A0B0B4A8B8B = 421
17970: 0D0B0B0B4A3B8B3D1 = 344
17978: C0D0B7D0B4A4B5B0 = 560
17986: 0B0B4A4B0B0B0B0B = 467
17994: CD0B8B4A8D0B9B8A = 686
18002: 4A3B0B0D4B0B0B4A = 348
18010: 0B0B0B4A0B0B0B0B = 467
18018: 0B3B0B0B0B3B4CB8 = 482
18026: 0B0B0CD7B6B9B0B6 = 370
18034: 4D0B0B0B0B0B0B4CD = 561
18042: 0B7D1A8B0B0B4A4F = 367
18050: 8B0B0B0CD8B7D1A1 = 544
18058: 0B8B4A2D4A4B0E0E = 309
18066: 0B0B0B4A0B0B4CCD = 457
18074: 0B8B4A1B0B0B8B4A = 483
18082: 0B0D0B4A1B7D0B8A = 510
18090: 8A4A8B4A3B8A1B31 = 514
18098: 1B8B2B1A8B3B8A1B = 514
18106: 0B0B4A1B4A0B0B0741 = 299
18114: 0B0D0B0A0B0B4A8B = 663
18122: 8A1B8B0B0A1A1B8B = 483
18130: 1B0B2A1B1B0B8B8B = 483
18138: CD0B3B8B0B0B14B2 = 388
18146: 0D0BFB7B0B0B3DE0 = 309
18154: 8A7B7B0B0B4B1B1B = 1063
18162: 47D8B8C4D1110B02 = 657
18170: 1B0D1A8BFFB8B8B7 = 993
18178: 0B0B0B0B0B0B0B0B = 914
18186: 0B0B0B0B0B0B0B0B = 914
18194: 1B8B1A1B0B0B1D1D = 559
18202: 1B0B0B0B0B0B0B0B = 505
18210: 1B0B0B0B0B0B0B0B = 505
18218: 0B1B1A1B1B1D1D1D = 559
18226: 0B1B1A1B1B1D1D00 = 514
18234: 0B0B7B8B0BFB1B8A = 496
18242: 0B0B7B8B0BFB1B8A = 496
18250: 0B0B0B0A0B8B0B0B = 370
18258: 0B0B0B0A0B8B0B0B = 370
18266: 0B0B0B0A0B8B0B0B = 370
18274: 0B0B0B0A0B8B0B0B = 370
18282: 0B0B0B0A0B8B0B0B = 370
18290: 0B0B0B0A0B8B0B0B = 370
18298: 0B0B0B0A0B8B0B0B = 370
18306: 0B0B0B0A0B8B0B0B = 370
18314: 0B0B0B0A0B8B0B0B = 370
18322: 0B0B0B0A0B8B0B0B = 370
18330: 0B0B0B0A0B8B0B0B = 370
18338: 0B0B0B0A0B8B0B0B = 370
18346: 0B0B0B0A0B8B0B0B = 370
18354: 0B0B0B0A0B8B0B0B = 370
18362: 0B0B0B0A0B8B0B0B = 370
18370: 0B0B0B0A0B8B0B0B = 370
18378: 0B0B0B0A0B8B0B0B = 370
18386: 0B0B0B0A0B8B0B0B = 370
18394: 0B0B0B0A0B8B0B0B = 370
18402: 0B0B0B0A0B8B0B0B = 370
18410: 0B0B0B0A0B8B0B0B = 370
18418: 0B0B0B0A0B8B0B0B = 370
18426: 0B0B0B0A0B8B0B0B = 370
18434: 0B0B0B0A0B8B0B0B = 370
18442: 0B0B0B0A0B8B0B0B = 370
18450: 0B0B0B0A0B8B0B0B = 370
18458: 0B0B0B0A0B8B0B0B = 370
18466: 0B0B0B0A0B8B0B0B = 370
18474: 8A1B8FFFB8B4B0B6 = 554
18482: 8B8D8B8A8B8B0B39 = 333
18490: 8B8B3B1B0B3B1B8A = 445
18498: 0B3CAE0131000278A = 285
```

(Continued on page 169)

NO HOME COMPUTER IS COMPLETE WITHOUT IT

Because Touchmaster opens up the home computer.

First, to the full range of users, even the very young.

Secondly, to a whole new style of software ("Touchware"), which is not limited by the keyboard.

Touchware goes all the way from early education packages to sophisticated graphic programs.

What's more, comparable pads are limited because their surface is composed of either a bank of switches of finite size or carbon tracks laid in a grid.

Or they need a delicate electronic stylus. Or they offer a limited working surface. Touchmaster's full A4 printed surface, by comparison, is totally linear.

It has a resolution of 256 x 256 points (that's what makes Touchmaster so flexible).

Now anyone can master the home computer

TOUCHMASTER

For full details, contact **Touchmaster Limited,** PO Box 3, Port Talbot, West Glamorgan SA13 1WH, or phone **Teledata (01) 200 0200**

ALL-IN-ONE

Spectrum owners! Imagine what great use you could make of all these components. Rotronics have integrated them all into one attractively styled, compact unit. All the power and convenience of floppy disk can now be yours, but at a fraction of the cost.

A complete package

Wafadrive is extremely versatile. Five major components are housed within this one unit – the micro interface, two 128K drives, RS232 serial and Centronics parallel ports. Also included in the package are a blank wafer and Spectral Writer – a superb word processor program. The micro interface forms the nerve centre of Wafadrive, controlling all its major functions. The dual drive configuration and the ability to connect standard peripherals directly provides professional system flexibility. All this without a mass of separate components and vulnerable cables. Wafadrive transforms your Spectrum into a very powerful system.

Speed, reliability and capacity

The wafers contain an endless loop of specially developed magnetic tape driven at high speed past a read/write head. The result is fast access without data loss. Three sizes of wafer are available with minimum formatted capacities of 16K, 64K and 128K. The 128K wafer costs £3.95.

Data transfer rate is approximately 2K per second. Access time is proportional to capacity. 16K wafers are ideal for program development, with the larger capacity wafers being more suitable for general use and archiving of completed programs and data. Mechanical longevity is assured by the use of high grade materials throughout and full interchangeability between machines is guaranteed.

Extensive software applications

Wafadrive provides intelligent file handling and rapid access to data. Program development and other applications can be performed with ease. Start word processing immediately with the specially developed software package included with Wafadrive. Or battle with a spectacular interactive games program. Whatever your mood, you'll find the sophisticated Wafadrive software challenging and rewarding. Future versions of Wafadrive will be available for most popular home micros, so software back-up will be comprehensive.

For further information contact us now for our full colour brochure.

ALL-IN-ONE PRICE £129.95 (Inc. VAT)

Available from all Spectrum dealers, Grattan catalogue and SMT mail order.
Trade enquiries: Micro Dealer (UK) Ltd., 29 Burrowfield, Welwyn Garden City, Herts. Tel: (07073) 28181.

ROTRONICS
WAFADRIVE

ROTRONICS LTD. SANTOSH HOUSE, MARLBOROUGH TRADING ESTATE, WEST WYCOMBE ROAD, HIGH WYCOMBE, BUCKS. HP11 2LB TEL: (0494) 452757

(Continued from page 167)

```
18506: FF3934382E392E34 = 617
18514: 328A9002E3300039 = 288
18522: 2D2A003934350031 = 298
18530: 2A2B3916FF2D2533 = 553
18538: 29002A3373326F3F = 336
18546: 0034280026300PA = 228
18554: 3334373234343A3FF = 529
18562: 2633393A1632A93A = 373
18570: 2E3B0B2E2A37EA = 453
18578: 2B37343200 3E343A = 372
18586: 0028263FF372A26 = 319
18594: 2B2A3F2E2A37E = 345
18602: 002C2E3131 2A73E = 339
18610: 002E3300392D2AFF = 496
18618: 2E8B3A2A1BFFFB2 = 908
18626: 343B2A32A333900 = 353
18634: 2E3800262B2D2EEA = 313
18642: 3B2A29002E73E0020 = 875
18650: 00A2A2A38FFF00 = 15
18658: 0000000000002E14 = 66
18666: 3A3FF3F14312A2B = 583
18674: 3900000000000028 = 97
18682: 1A72E2C033PF00 = 522
18690: 0000000000021429 = 111
18698: 343C33FFFB5372A = 951
18706: 3B38E332C002E00 = 899
18714: 103A3511003772E = 297
18722: 2A31393800E3300 = 317
18730: 26FF2A3433C333C2B = 595
18738: 3720343434B2A32 = 349
18746: 2A3339003428B039 = 302
18754: 2D2A003262 3FA1A = 306
18762: 2C2D2E2B2D00D2E = 541
18770: 2A2E33380039D2E = 327
18778: 39003E343A003839 = 342
18786: 263EFF3E3432E34 = 612
18794: 3312A3E3800C2D = 359
18802: 2E312A003982E00 = 281
18810: 3283F2AFF32343B = 609
18818: 2A3800263734 3A33 = 352
18826: 2900 3E343A1BFFFF = 750
18834: B92D2A003C263E00 = 432
18842: 392D2E332C380028 = 337
18850: 372A003E3132A2B = 395
18858: 003922E39FFE33 = 841
18866: 3938003234 3B2A00 = 316
18874: 2B2E3332B2A370026 = 329
18882: 3900D2EEC2DA37 = 334
18890: FF392A3235A3726 = 592
18898: 393A372A31BFFAB = 721
18906: 3A37392E2A373234 = 414
18914: 372A1A003928A2B = 325
18922: 2B2A2E393A372A00 = 347
18930: 372E3E2A38FF2E38 = 504
18938: 003E2A343700 3B2A = 323
18946: 3437200 2E332837 = 341
18954: 2A2E3E2A381BFFA8 = 684
18962: 3433E2E38 2A2A3 = 406
18970: 3933E1A002E3339 = 340
18978: 3800323A3E2A002B = 302
18986: 2E3B392A37FF2E38 = 597
18994: 003E343A7003E3 = 323
19002: 3437200372E38 2A = 348
19010: 38FFB92D2E3800032 = 693
19018: 2E3002A3800351 2B = 324
19026: 3E2E332A002D2E38 = 341
19034: 292A37003C2DA33 = 336
19042: FF392D2A002E2E32 = 531
19050: 2A003E2A2A3 = 340
19058: 392A381BFFFFA2B = 900
19066: 392A37003 92D2A38 = 354
19074: 2A002E3338393 73A = 365
19082: 2E39E3A3330002E = 364
19090: 343AFF2E2E3300E2E = 532
19098: 292F3A3E39003 92D = 361
19106: 2A002E3 2E3 = 281
19114: 3116FF392A3 52A = 590
19122: 3726393A372A1B00 = 332
19130: 2E3A3E3E3 92E34 = 308
19138: 2E3E3E3 73 3E2A37 = 365
19146: FF392E2E3300 1E1E = 506
19154: 002E2A2E37 2EA38 = 322
19162: 1A002E3 7003E343A = 305
19170: 002E3E3E39FF2E = 357
19178: 002E003 72A2E3100 = 222
19186: 2E2E3 2E39E2E31B = 340
19194: 2A2E3E3E3 92E2E1B = 349
19202: 392D2A002E3339 38 = 346
19210: 1E3 32A3E39003E34 = 342
19218: 2A002E2E3 3002E34 = 279
19226: 3E2AFF2E2E3 73A3 = 348
19234: 3E003 92D2A38 2A00 = 298
19242: 2E2E2E3 3 72A3E00E = 358
19250: FFFE2E1700140003E = 315
19258: 343A1 002E3 13C2E = 321
19266: 3E3E002E3 3039 2D = 317
19274: 2A002E3 2E3 3E39FF = 547
19282: 2A002E00000003 42E00 = 95
19290: 392D2A003 28372A = 337
19298: 2A33FF3E1B8E1400 = 686
19306: 2E3E3 1E3 2E3 = 295
19314: 003922E2E002E2E3 = 275
19322: 31A372E2A38FF00 = 545
19330: 1C001400 3 432A00 = 193
19338: 2A2E3E3 2E2A001C = 268
19346: 2E002E3 3 93FF00 = 491
19354: 1B001400263 3002A = 178
19362: 2E2C1400 3 34739 = 338
19370: 2E002100 3534 2E33 = 280
19378: 393BFFFB92A900 = 895
19386: 392A2E3E2A372E39 = 394
19394: 3A372A003C2E3131 = 359
19402: 0037 2E3E2A002E3E = 300
19410: FF1E002E2A2C1B00 = 439
19418: 2A3E2A3 2E2E1C1C = 317
19426: 1C1003E3 42E3 3 = 315
19434: 3E1E003 2E2A FF2E = 519
19442: 003E3E2E3 2E31 3 = 368
19450: 2E3E3E2E3 2E3 = 304
19458: 2A2A2E3 00A3E1FF = 516
19466: FFA2E2E003E343A00 = 644
19474: 2C2A3E3 00E3E3 = 365
19482: 2E002E3E002E3 3 = 234
19490: 2E33391AFF3E343A = 599
19498: 003E2E3 1 3 1 3 = 305
19506: 3E2E3 1 3 1 3 = 222
19514: 3E343A37001FFF31 = 562
19522: 2E3E2A3 3002E3 3 = 333
19530: 002E2E003 72A3E34 = 283
19538: 3E2E3A2E343 32E34 = 391
19546: 002E33FF392D2A00 = 496
19554: 393A3E003 12A2B39 = 353
19562: 1A2E2E3 2E3 2E34 = 289
19570: 3 32A3 7FFFA3D = 944
19578: 3937E600283433 39 = 350
19586: 2E34 3 2E3 2E3 72A = 347
19594: 3EFFFE2E003E002B = 624
19602: 372A2A3FA002628 = 322
19610: 392E3433FF26000E = 513
19618: 002E3 2E3 3 = 310
19626: 002E2E3 2A FFFFFF = 939
19634: FFA3434 2900313A = 679
19642: 2E3B1B1B1B1BFFFF = 706
19650: 1B1B1B1C1C1C1C1C = 1116
19658: 5800EA7E7E3E002 = 673
19666: 2140CD2C4D444D0D = 581
19674: 2B0D0FF2E0E12E3 = 999
19682: FE2E806FE2E2E1B = 690
19690: 1BE3A2140FE0028 = 705
19698: E1303E2E140 2A0E40 = 553
19706: 1B1B1B1B1B2E3 = 522
19714: 2E1BF53A214DFE1E = 745
19722: 2BDE3C3E2140 2A0E = 525
19730: 4D2B3C3FFE2E20BA = 795
19738: 3E1C1BF53A214006 = 512
19746: 004FC9C9786000514 = 624
19754: 00EA7E7E3CDB00244 = 932
19762: 2E3E140FC0E145 = 860
19770: E5C1C9C9786000E28 = 988
19778: 00EADD21494DC9ED = 1076
19786: 6F01011B2EF3CDB5 = 815
19794: 4C3A0040FEFC400 = 829
19802: 00C09200CD2002DD = 813
19810: 21494DC3A402101C = 600
19818: 7600072A0EAF8E3E = 694
19826: 2005E3C3C3F4EFE = 660
19834: 2E2005E3E2C33F42 = 875
19842: FE32200 53E01C33F = 662
19850: 42FE3FC2E04AFFC3 = 1200
19858: 3F423D3D3D76 = 430
```


LOOK WHAT YOU MISSED IN BEEBUG VOLUME TWO

BBC MICRO
– USER SUPPORT –

● 10 ISSUES OF BEEBUG MAGAZINE MAILED FREE TO MEMBERS ● 30 EXCITING GAMES AND VISUAL PROGRAMS ● 43 SOFTWARE REVIEWS ● 33 HARDWARE REVIEWS ● 16 BOOK REVIEWS ● 150 HINTS AND TIPS ● 25 APPLICATION PROGRAMS ● SERIES OF ARTICLES FOR BEGINNERS ● MANY ADVANCED TECHNICAL ARTICLES ● NEWS AND PRODUCT INFORMATION ● PLUS SPECIAL OFFERS ● BIG DISCOUNTS ON A WIDE RANGE OF PRODUCTS ● EVENTS ● BRAIN TEASERS ● LOCAL CLUBS ● FULL MAGAZINE INDEX

A YEARS SUBSCRIPTION WOULD HAVE BOUGHT YOU ALL THIS

Figures based on the 10 issues of BEEBUG Volume 2.

BUT IT'S NOT TOO LATE TO JOIN FOR VOLUME THREE

BEEBUG PUBLICATIONS LTD. PO BOX 109, HIGH WYCOMBE, BUCKS

PLEASE ENROL ME FOR VOLUME 3 of BEEBUG AT £11.90 (10 ISSUES)

NAME .....

ADDRESS .....

..... AMOUNT ENCLOSED .....

BEEBUG HAS BEEN ESTABLISHED FOR TWO YEARS AND NOW HAS OVER 25,000 MEMBERS. IT OFFERS TOTAL USER SUPPORT TO ALL BBC MICRO USERS.

PLEASE MAKE CHEQUES MADE PAYABLE TO BEEBUG PUBLICATIONS LTD.
AND SEND TO:- DEPT 4 PO BOX 109, HIGH WYCOMBE, BUCKS.
(DISTRIBUTION AGENTS FOR BEEBUG)

Challenging, sophisticated, advanced, extra special.

Be the world's greatest sleuth — in the most advanced and challenging adventure game ever.

For the first time ever, here is an adventure game in which you can talk with intelligent characters, ask them questions and argue with their conclusions — all in everyday English sentences.

Work against time to solve the mystery as you travel about Victorian England. Villains, suspects and witnesses all live out their lives in a realistic manner, and you can never be sure of who or what you will find anywhere. You must be alert because nobody is above suspicion.

In 'Sherlock', the world of the famous private detective comes vividly to life. Time passes naturally: day turns to night, racing towards the inescapable deadline. You must ensure Sherlock has sufficient time for sleep, money to travel on public transport and other necessities. And you can rely on Dr. Watson to help you collate information, or gather clues.

'Sherlock' makes the maximum use possible of the 48K Spectrum and is the result of 15 months' work by a team led by programmer Philip Mitchell, the author of 'The Hobbit'. The text and graphics of 'Sherlock' makes it the most exciting and sophisticated adventure game yet devised.

"Never before have I experienced a game so atmospheric and realistic. I was totally captivated and caught up in this most fascinating adventure. The characters are simply amazing. They do lead their own lives. It's all so unpredictable." —G. Dempster, Scotland.

A real adventure!

☐ Please send me your free catalogue.

☐ Please send me Spectrum 48K Sherlock @ £14.95

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Orders to:
Melbourne House Publishers,
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

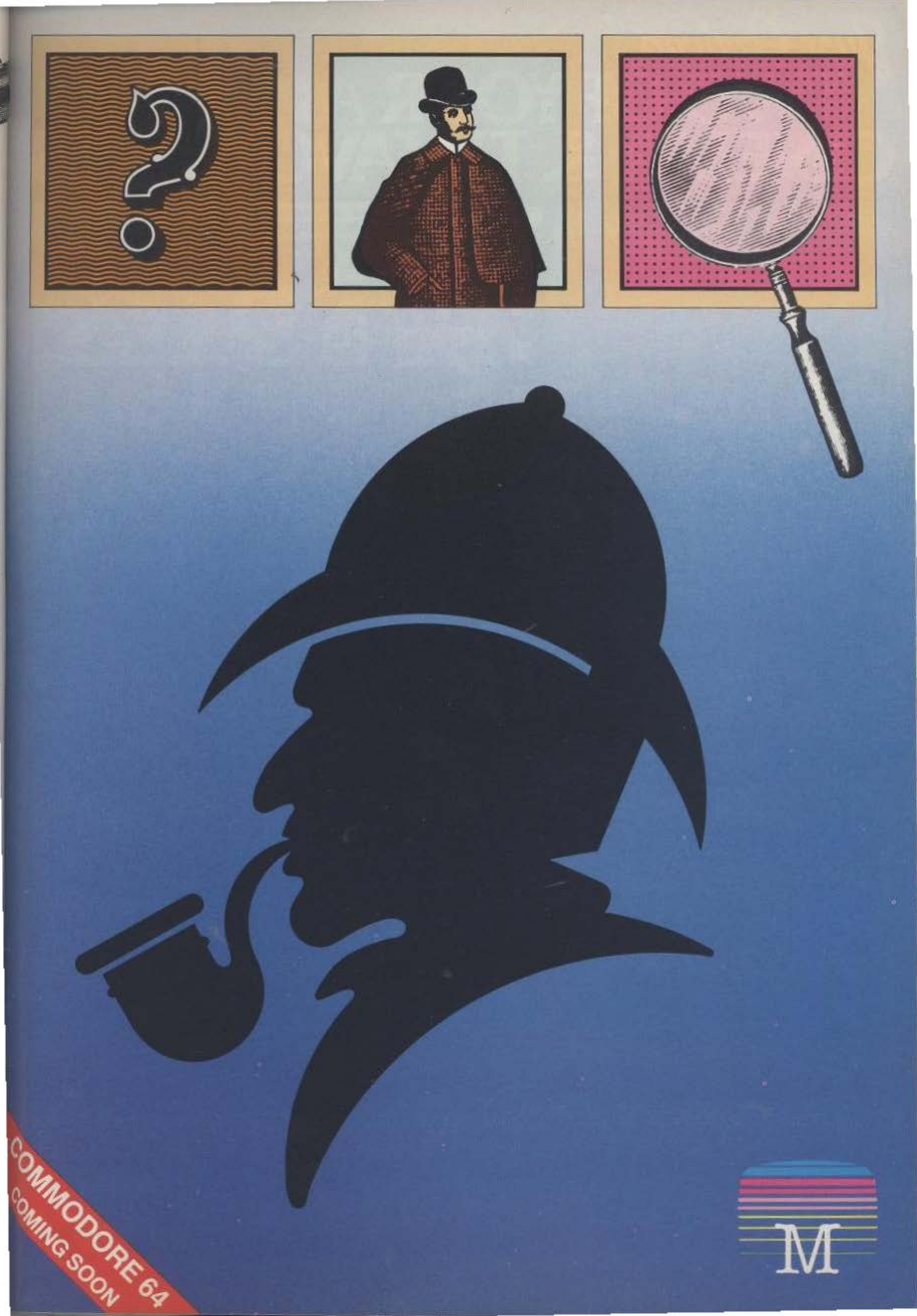
Correspondence to:
Church Yard,
Tring,
Hertfordshire HP23 5LU

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5001.

All prices include VAT where applicable. Please add 80p for post and pack.
Trade enquiries welcome.

YC11A

I enclose my cheque/money order for £		£
Please debit my Access Card No.	Expiry Date	£ +p/p .80
Signature		Total
Name		£
Address		
	Postcode	


COMMODORE 64
COMING SOON
M

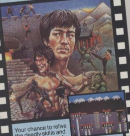
Just Arrived!

TWO OF YOUR ALL-TIME CINEMA & T.V. FAVOURITES

THE LEGENDARY

BRUCE LEE

64 ATARI



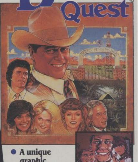
Your chance to relive the deadly skills and awesome power of the legendary Bruce Lee.

- Twenty secret chambers.
- Dazzling graphics and animation.
- Unique multiple player options.

Disk and Cassette £14.95

64 ATARI Danger, Intrigue, Suspense! You'll need all your wits and skill when you take on the ruthless J.R. and face the many hidden enemies in the search for oil that is...

The DALLAS Quest™



- A unique graphic adventure.
- Choose your level of difficulty.
- Scores of colourful scenes.

Disk only £14.95

Two more quality products from Datasoft Software. Datasoft

THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores.

DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591.

Overseas enquiries welcome.

U.S. GOLD

All American Software

RESPONSE FRAME

Do you have a problem? Your manual is incomprehensible or you just cannot get the hang of that programming trick you tried — whatever it is, Tim Hartnell will do his best to answer your queries. Please include only one question per letter and mark them "Response Frame".

STATIC MICRO

■ I am 16 years old and have had many problems with computers. My first computer was a 16K Spectrum. This worked well for a month but developed keyboard trouble and was returned for a replacement. The replacement wouldn't Save, so was sent back for a refund. With this money, I bought a TI 99/4a. This was found to have faulty colour, so was replaced. Since then, I have had four more TI 99s, all of which have developed various faults, the most serious of which was a total loss of function — couldn't even get the "power on" light to work. A friend of my mother's said he had heard that some people cannot use computers because of bodily static electricity. Is this possible, or have I just had bad luck? Incidentally, I have used a friend's computer regularly, without any trouble. I hope you will answer this, as I am still interested in computers and hope to get an Electron if I get a positive reply.

Andrew McDermott,
Halifax.

SHADES OF The Omen! Your story, Andrew, about static electricity seems to me to be as valid as the fear many parents have that using a computer connected to the TV will somehow ruin the television. Certainly, some computer components can be destroyed by static electricity but this is the first time I've heard a claim that evil powers in the operator would render the computer inoperative.

My experience with TI 99/4a's has been all positive. They seem to work reliably — albeit excrutiatingly slowly — and friends of mine who have them have reported no excessive failure rate.

The fact that you can use your friend's computer without causing it to self-destruct suggests, to me, that there may be problems — if such things are possible — in the wiring of your house. Unusual electrical surges could be, at least, blowing fuses — which sounds like what happened with your fourth TI. For what it's worth, you might like to chat with an electrician about your house wiring and enquire at the same time regarding the stability of the power supply in your area. Have you tried running your friend's computer at your home?

SPECTRUM BUG?

■ I think I have found yet another bug in the Sinclair Spectrum ROM. I was writing a simple program in which the user enters the three lengths of the sides of a triangle. The length of the longest side is entered first, followed by the other two. The program then prints a message showing if the triangle is a right-angled one. When I was testing the program — which I was sure was correct — I entered the numbers for the 26, 24, 10 right-angled triangle. To my surprise, the computer told me the triangle I had entered was not a right-angled one — which it is! Is it me or my Sinclair computer which is wrong? Here's the program:

```
10 INPUT "LONGEST SIDE FIRST";A
20 INPUT "NEXT SIDE";B
30 INPUT "NEXT SIDE";C
40 IF C^2 + B^2 = A^2 THEN PRINT
   "A RIGHT ANGLED TRIANGLE":
   PAUSE 1:PAUSE 0:RUN
50 PRINT "NOT A RIGHT ANGLED
   TRIANGLE":PAUSE 1:PAUSE 0:
   RUN
```

Darren Patridge,
Tiptree,
Nr Colchester.

CLAIMS LIKE THIS, Darren, are heard very frequently. The problem lies not in your Spectrum, but in the way which *all* computers store numbers. They are never stored exactly. Even my IBM PC will inform me that 85/100 equals 0.849999. Certain micros available on the UK market will solemnly inform you that 4/2 does not equal 2 — because the computer stores 4/2 as 2.000001.

The way to test what your computer is really doing, in this and any other program in which you wish to compare the results of calculations, is to get the computer to print out its findings, i.e., tell it to Print C^2, B^2, A^2 and compare the three. Then, instead of looking for an exact match, get the computer to look for a minimum difference. In your case, line 40 could read:

```
40 IF ABS((C^2 + B^2) - A^2)<.0001
   THEN PRINT "A RIGHT ANGLED
   ..."
```

HOW GOOD IS MSX?

■ I have read a lot about MSX Basic in the past few months. I understand that it is a new standard so that you can run software written for one MSX computer on another. How well is MSX going to be accepted in the UK?

Martin Barlow,
Albany.

IF I COULD PREDICT the future, Martin, I would not be writing for *Your Computer*. No-one knows whether or not MSX will ever get off the ground. Certainly, Microsoft in America, who invented it, are pushing for it to become the standard. More than 30 — at last count — Japanese manufacturers have either embraced the standard — or said they will in due course. My guess is that it will gain a certain acceptance over the next two years, so that it runs parallel to the de facto standards we have here such as Sinclair Basic and BBC Basic. It has, I believe, little chance of dislodging Microsoft Basic — as in PC-DOS on the IBM PC — in the States — although Microsoft and MSX Basics are very, very close; except for the graphics and sound.

The MSX standard is built around a Z-80A processor, and specifies such things as sprite control in the graphics, single channel sound, a Centronics printer interface, Atari-type joystick ports, cassette output — 1200/2400 baud — and three graphics modes — two text 32 × 24 and 40 × 24 and one "hi-res", which is 256 × 192.

So long as you stick with one of the biggies in the UK — such as the Spectrum or the Beeb — you have little chance of buying a machine whose support dwindles to nothing in the next 18 months.

CHEAPER BEEB

■ At the moment, I am saving up for an Electron, but I would have preferred a BBC Model B. Could you please tell me if the BBC Model B will be coming down in price in the near future?

S G Hornby,
Warton,
Preston.

ONE NEVER knows what thoughts lurk in the minds of those at Acorn, but the chances of the Beeb coming down in price seem to me to be very, very slim.

BUSINESS PROGRAMS

■ I have a Vic-20 micro and cassette recorder in good working order. My problem is that I had a brain stroke two years ago which has impaired my memory and manual dexterity. I find the manual entry of a program very difficult and boring. I want a micro offering software with simple home and business accounting programs, *not* games. What do you advise, since I am prepared to sell my Vic-20?

K F Searle,
Watford.

FIRST OF ALL, be prepared for a grave disappointment if you try to sell your Vic-20. The money you would get for it will be very, very little compared to what you paid for it. You do not mention how much you wish to spend on a computer which makes giving you specific advice fairly difficult. I imagine that a computer which allows use of discs, rather than a cassette recorder would be easier to use and therefore suggest you could consider a BBC Micro with discs. This, however, is not cheap.

Before you do anything, I would suggest you look through the advertisements in this issue of *Your Computer* and call a Commodore dealer, describe your software requirements, and see if you can get anything suitable for your Vic-20.

TAPE TO DISC

■ I have recently purchased a Cumana disc drive for my BBC Micro, and would like to save programs on disc from tape — Basic and machine code. I have little knowledge of machine code and assembler. Could you tell me how it could be done?

P A Jamison,
Virginia Water,
Surrey.

MANY PEOPLE, including myself, would love to know how to do this. However, we dare not risk the wrath — and the lawyers — from Acorn. One magazine printed a routine for bypassing the locks on cassette software from Acornsoft, so it could be transferred to disc, and got hit with a £70,000 fine for their trouble.

PRINTER ADVICE

■ Can you advise of a printer with a superior width of presentation to the ZX printer?

J A Jones,
10 Shalbourne Rise,
Camberley,
Surrey.

THERE ARE a number of interfaces now available to allow you to hook a "real" printer to your Spectrum. However, as far as I know, they do not offer a "superior width". However, I have printed your address in full so any manufacturer who thinks he can help can get in touch with you directly.

In an earlier issue of *Your Computer*, I gave a way of adding a line numbered zero to a Spectrum program. Mike O'Donnell of Palacefields, Runcorn, Cheshire, has sent me a method of adding line zero which he says has two advantages. One, it is easier than the method I outlined, and two, it *can* be removed. Here's Mike routine:

```
First enter your line number,
as 1 REM ...
Next POKE 23756,0
Press Enter then List

To remove the line:
POKE 23756,1
Press Enter and List
```

Thanks for this routine, Mike, which I note you acknowledge as having been shown to you at your local computer club. I agree that it is simpler than my method, but the very fact that it *can* be removed makes its inclusion rather pointless. I was trying to give a way to put a copyright notice within a program which could *not* be removed.

POWER UP!

Your First Commodore 64 Program

R. Zaks **£7.95**

You can learn to write simple programs without any prior knowledge of mathematics or computers! Guided by colorful illustrations and step-by-step instructions, you'll be constructing programs within an hour or two.

ISBN: 0-89588-172-1, 7"x11", 182 pp, illustrated

also available for VIC-20, APPLE II, ATARI, IBM, TI99/4A

Your Second Commodore 64 Program

G. Lippman **£8.95**

The many colorful illustrations in this book make it a delight for children and fun for adults who are mastering BASIC programming. A sequel to **Your First Commodore 64 Program**, the book follows the same thorough, detailed approach and brings you to the next level of programming skill. With these BASIC language techniques, you'll soon be creating your own applications!

ISBN: 0-89588-152-7, 7"x11", 240 pp, illustrated

also available for APPLE II

ATARI BASIC Programs in Minutes

St. R. Trost **£8.95**

You can use this practical set of programs without any prior knowledge of BASIC! Application examples are taken from a wide variety of fields, including business, home management, and real estate. Just type them in and they're ready to run!

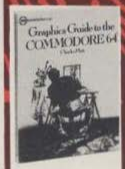
ISBN: 0-89588-143-8, 6"x9", 170 pp, illustrated

Power Up! Kids' Guide to the Commodore 64

M. DeJonghe/C. Earhart **£7.95**

Colorful illustrations and a friendly robot highlight this guide to the Commodore 64 for kids 8-11. The hands-on approach features short, easy lessons, and the spiral binding makes it ideal for use right at the computer. The engaging exercises are full of surprises and discoveries. By the end of the book, kids will be programming their own guessing games, "all-purpose" thank-you notes, multi-colored pictures, and simple animation. The authors are elementary school teachers with several years of computer experience.

ISBN: 0-89588-188-8, 9"x7", 192 pp, illustrated



Graphics Guide to the Commodore 64

Charles Platt **£9.95**

This easy-to-understand book is the first to answer the need for a Commodore-specific graphics guide. It will appeal to anyone who wants to master the Commodore 64's powerful graphics features. You'll learn to move images across the screen, built your own character sets, and create impressive headlines and detailed pictures on the screen. A full color collection of screen displays is included, as well as instructions on how to create your own video games.

ISBN: 0-89588-138-1, 7"x9", 261 pp, illustrated

Programming the 6809

Zaks/Labiak **£11.95**

Get more out of your 6809 microprocessor – this book is chock full of programming tricks to show you how. Start with the basics of assembly language programming, and go on to understand registers and buses, subroutines, the 6809 instruction set, addressing modes, I/O techniques and devices, data structures, and useful applications. Give your 6809 processor 16-bit performance with 8-bit economy. No prior programming knowledge is required.

ISBN: 0-89588-078-4, 6"x9", 362 pp, illustrated

The Commodore 64/ VIC-20 BASIC Handbook

D. Hergert **£9.95**

In this dictionary-style handbook, you'll find clear descriptions and examples of each word in the Commodore 64/ VIC-20 BASIC vocabulary. The proper syntax of every keyword and function is explained carefully and thoroughly in easy-to-understand English. Short example programs illustrate the correct use of each command, and special notes provide insight into subtleties and extra features of Commodore 64/ VIC-20 BASIC.

ISBN: 0-89588-116-0, 6"x9", 185 pp, illustrated

SYBEX COMPUTER BOOKS KEEP YOU UP ON HOW TO GET THE MOST OUT OF YOUR COMPUTER.

SYBEX Computer Books are available through most leading bookshop and your local computer store. Ask for them! Our books are also available from COMPUTER BOOKSHOP, Birmingham, W.H. SMITH, JOHN MENZIES and BOOTS. In case of difficulty contact us directly, enclosing your check or money order (include 80p for postage and packing).

SYBEX

SYBEX Ltd.
Unit 4, Bourne Industrial Estate
Crayford, Kent DA1 4BU
Tel: Crayford (0322) 57717

SOFTWARE FILE

Software File gives you the opportunity to have your programs, ideas and discoveries published. We will accept contributions for any home computer provided they are submitted to *Your Computer* exclusively. Please double-check your programs and specify the memory they require before sending them, preferably on cassette. We pay between £6 and £36 for contributions published.

Karate!

Alexis and Mario Chiotis, Finchley, London N12.

CBM-64

KARATE IS A two-player game based on the Japanese form of martial art, for the Commodore 64.

Using the multicolour sprite facility on the 64, we have created many of the elements of the real thing for example punching, kicking etc., without the pain. To play you will need two joysticks and quite a bit of skill.

When the program is run you will be allowed to choose the colour of your Karate suit. This is done using F1 and F3. To continue, press F7. You will then be asked how long the fight will last, and also the names of the players.

The next scene is where the fighting takes place. The two men stand on their lines, bow, and are then ready to fight. By using the combination of joystick movements, shown on the chart, some complicated and exciting fights can be achieved.

After a little practice, you will soon master these techniques and produce some startling effects.

Finally, the winner will be displayed showing off his skills by attacking a brick wall.

If you would like a copy of Karate, just send £3.50 including post and packaging to: Karate Offer, 7 Torrington Grove, Finchley, London N12 9NA.

Joystick port one (controls player 2).
North: Jumps in the air and kicks.
North-west: Does a high kick towards opponent's chest.
West: Moves player two forward.
Fire: Kicks towards opponent's stomach.
West and Fire: Blocks oncoming punches and high kicks.
South-West: Sweeps opponent's legs away.
South: Ducks. Can also be used to pull opponent's legs away.
East: Steps back.
East and Fire: Punches.

Joystick Port two (controls player 1).
North: Jumps and does a high kick.
North-east: Does a high kick towards opponent's chest.
East: Moves player 1 forward.
East and Fire: Blocks oncoming punches and high kicks.
South-east: Sweeps opponent's legs away.
South: Ducks. Can also be used to pull opponent's legs away.
West: Steps back.
West and Fire: Punches.

Variables.
C1: Colour of player one's karate suit.
C2: Colour of player two's karate suit.
J1: Peek of joystick port one.
J2: Peek of joystick port two.
P1: Player 1 score.
P2: Player 2 score.
S1: Sprite 1, i.e., 2040.
S2: Sprite 2, i.e., 2041.
T$: Time.

```
1 GOSUB10000
2 CLR:C1=1:C2=1:PRINT"J":GOSUB1500:GOSUB1520
3 GOSUB2000
4 GOSUB1000
10 POKE2040,192:POKE2041,193
12 POKES3240,112:POKES3250,212
13 POKE2040,214:POKE2041,213
14 PORT=1TO988:NEXT:O=PEEK(53278)
15 POKE2040,192:POKE2041,193
20 J1=PEEK(56321):J2=PEEK(56320):PRINT"[redacted]TR$(P)TR$(27)PZ
21 IF=RND(0):IF.2>4"[redacted]":NEXT:IF(T$.2)PRINT"J":IF=(T$)T$=GOSUB2000
22 IF.2<103THEN24
23 POKE2040,209
24 IF.1<225THEN40
26 POKE2041,209
40 IF.1<255THEN60
42 POKE2041,193
60 IF.2<127THEN80
61 POKE2040,192
80 IF.1<229THEN100
82 POKE2041,199
100 IF.2<111THEN120
102 POKE2040,198
120 IF.1<231THEN140
122 POKE2041,196
140 IF.2<107THEN160
142 POKE2040,197
160 IF.2<119THEN180
164 IFPEEK(53248)<250THEN198
165 IFPEEK(53278)<115THENPOKES3248,PEEK(53248)+5
180 IF.2<123THEN200
182 POKE2040,206
184 IFPEEK(53248)<280THEN200
186 POKES3248,PEEK(53248)-5
200 IF.1<250THEN220
202 POKE2041,203
220 IF.2<107THEN240
222 POKE2040,202
240 IF.1<249THEN260
244 POKE2041,205
260 IF.2<111THEN280
262 POKE2040,204
280 IF.1<224THEN300
282 POKES3251:PEEK(53251)-25
284 POKE2041,201:PORT=1TO20:NEXT:POKE2041,199
286 PORT=8TO400:NEXT
300 IF.2<126THEN320
307 POKES3249,PEEK(53249)-25
309 POKE2040,200:PORT=1TO20:NEXT:POKE2040,198
311 PORT=1TO400:NEXT
320 IF.1<253THEN340
324 POKE2041,201
340 IF.2<125THEN360
342 POKE2040,200
360 IF.1<24?THEN380
362 POKE2041,207
363 IFPEEK(53280)<249THEN390
364 POKE3250:PEEK(53250)+5
365 POKE2041,193
380 IF.1<251THEN400
382 IFPEEK(53250)<201THEN400
384 IFPEEK(53279)<115THENPOKES3250:PEEK(53250)-5
389 POKE2040,192
400 IFPEEK(53278)<115THEN500
401 POKES3249,185:POKES3251,185
402 POKE2040,192:POKE2041,193
404 GOTO20
500 S=5272:FORL=8TO24:POKES+5,0:NEXT:POKES+8,248:POKES+1,33
502 POKES+5,7:POKES+22,104:POKES+23,4:POKES+24,15
503 POKES+4,129:FORT=1TO200:NEXT:POKES+24,0
508 POKES3249,185:POKES3251,185
509 B1=PEEK(2040):B2=PEEK(2041):O=PEEK(53278)
510 IF$1=192ANDS2=193THENGOSUB1000
511 IFS2=209ANDS1=202OR(S1=203ANDS2=203)THEN520
512 IF$1=192ANDS2=207OR(S2=193ANDS1=206)THEN420
513 IF(S2=208ANDS1=192)OR(S2=193ANDS1=209)THEN420
514 S3=S2-1:IFS1=S3THEN420
515 IFS1=202ANDS2=201THEN420
516 IFS1=208ANDS2=203THEN420
517 IFS1=198ANDS2=205THEN480
518 IFS1=204ANDS2=199THEN600
520 IFS1=192ANDS2=197THEN526
525 GOTO650
526 IFS1=192ANDS2=199THEN530
527 GOTO650
530 IFS1=192ANDS2=202THEN540
535 GOTO650
540 IFS1=192ANDS2=205THEN550
545 GOTO650
550 IFS2=193ANDS1=198THEN560
555 GOTO600
560 IFS2=193ANDS1=196THEN570
565 GOTO600
570 IFS2=193ANDS1=203THEN580
575 GOTO600
580 IFS2=193ANDS1=204THEN590
585 GOTO600
590 IFS1=193ANDS2=197OR(S1=199ANDS2=201)THEN600
595 GOTO650
600 IFS2=193ANDS1=196OR(S2=199ANDS1=200)THEN610
605 GOTO600
610 IFS1=202ANDS2=197THEN620
615 GOTO600
620 IFS2=203ANDS1=196THEN600TO20
625 GOTO650
630 IFPEEK(53248)<49?THEN656
634 POKES3248,PEEK(53248)+10
635 O=?:T=
636 POKE2040,211:POKE2041,212
668 PORT=1TO1500:NEXT
662 P=P+1
664 T1$=O$:GOTO10
680 IFPEEK(53250)<248THEN686
684 POKES3250,PEEK(53250)+10
685 O$=T1$
686 POKE2040,212:POKE2041,210
687 PORT=1TO1500:NEXT
689 P1=P1+1
690 T1$=O$:GOTO10
1000 PRINT"J":POKE214,14
1010 PRINT:PRINTTB(1)"[redacted]"
1020 PRINT"[redacted]"
1022 PRINT"[redacted]"
1024 PRINT"[redacted]"
1026 PRINT"[redacted]"
1028 PRINT"[redacted]"
1030 PRINT"[redacted]"
1040 GOSUB1500
1041 PRINT"[redacted]"
1050 I$=CHR$(13):PORT=1TO20:NEXT:POKE3251,6
1500 PRINT"[redacted]"
1510 PRINT"[redacted]"
1511 PRINT"[redacted]"
1512 PRINT"[redacted]"
1513 PRINT"[redacted]"
1514 PRINT"[redacted]"
1515 PRINT"[redacted]"
1516 PRINT"[redacted]"
1520 PRINT"[redacted]"
1522 PRINT"[redacted]"
1523 PRINT"[redacted]"
1530 POKE2040,192:POKE2041,193:POKE3276,3
1531 POKES3271,3:POKES3277,3
1532 POKES3205,8:POKES3206,18
1535 POKES3248,100:POKES3249,130:POKES3250,200:POKES3251,130:POKES3269,2
1539 POKES3207,C1:POKES3208,C2
1680 GETH$:IFH$=""THEN1680
1685 IFH$="[redacted]"THEN1610
1610 IFH$="[redacted]"THEN1610
1615 IFC1>15THENC1=0
1620 IFC1<1THENC2=0
1621 IFC1=20RC1=0ORC1=6ORC1=8ORC1=10THENC1=C1+1
1622 IFC2=20RC2=0ORC2=6ORC2=8ORC2=10THENC2=C2+1
1625 POKES3207,C1:POKES3208,C2
1630 IFH$="[redacted]"THEN1610
1635 GOTO1680
2000 PRINT"J":POKES3248,112:POKES3249,185:POKES3250,212:POKES3251,185
2002 POKES3271,15:POKES3277,3
2003 POKES3269,255:POKES3276,255:POKES3205,8:POKES3206,18
2004 POKE2042,194:POKE2043,195
2006 POKES3269,1:POKES3298,1
2007 POKES3264,8
2008 POKES3252,39:POKES3253,148:POKES3254,40:POKES3255,148
2009 POKE2047,215:POKES3294,14:POKES3262,177:POKES3263,155
2300 RETURN
3000 IFVAL(MID$(TI$,3,2))>0PRNP1(CP2THENPOKES3269,0:GOTO5000
3010 IFVAL(MID$(TI$,3,2))>35THENPOKES3269,0:GOTO5000
3020 RETURN
5000 POKE214,10:PRINT:PRINTTB(10)"OOPS! THE TIME IS UP.":PORT=1TO1500:NEXT
5005 PRINT"J":POKE214,8:PRINT:PRINTTB(27)"[redacted]"
5010 PRINT"[redacted]TR$(4)"THE WINNER WAS "
5020 PRINT"[redacted]TR$(B)
5030 IFP1>P2THENPRINTR$(1)
5040 IFP2>P1THENPRINTR$(2)
5050 GOSUB1500:POKES3248,192:POKES3249,128:POKES3269,1:POKE2040,192
5055 PORT=8TO400:NEXT
5060 POKE2048,192:PRINT"[redacted]  PRESS SPACE BAR TO RESTART,"
5070 GET$:IFG$=""THEN5070
5080 POKES3269,0:RUN2
5090 PORT=8TO400:NEXT:PRINT"J"
5095 POKE2040,202:GOTO855
6000 POKES3269,0:PRINT"J[redacted]  ENTER FIGHTING TIME LIMITM"
6001 PRINTTR$(8)"USING KEYBOARD NUMBERS"
6002 PRINTTR$(12)"APRX. 5 MINUTES[redacted]"
6010 A$="":GETA$:IFA$=""THEN6010
6020 A=VAL(A$)
6030 IFA<=4ORA>=53THENPRINL(A$):GOTO6100
6040 GOTO6010
6100 PRINTA:OPEN1,0:PRINT"EENTER YOUR NAME PLAYER ONE :":
6110 INPUT#1,NA$(1)
6120 PRINT"EENTER YOUR NAME PLAYER TWO :":
```

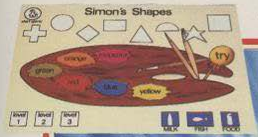
(continued on next page)

SOFTWARE FILE

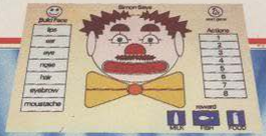
(continued from previous page)

```
6130 INPUT#1,H$(R)
6140 CLOSE1:RETURN
10000 PRIGINE FORTMPTUS FORMATING MEMORY FOR#1:M.M$(1) D=D$44 M$(1)
10010 RETURN
10100 DIM#0 94.0.0.124.0.0.115.0.0.124.0.0.40.0.0.148.0.0.171.0.0.184.0.0
10102 DIM#172.0.0.171.192.0.160.0.0.25.0.0.160.0.0.160.0.0.160.0.0.160.0.0
10104 DIM#165.0.0.160.0.0.175.0.0.160.0.0.252
10110 DIM#0.21.0.0.0.0.205.0.0.61.0.0.0.12.0.0.10.0.0.234.0.0.46.0.0.56.0.0
10120 DIM#234.0.0.42.0.0.0.85.0.0.42.0.0.42.0.0.42.0.0.42.0.0
10122 DIM#250.0.0.10.0.0.3
10124 DIM#168.0.0.47.252.0.44.12.0.0.47.204.0.47.60.0.44.204.0.47.252.0
10125 DIM#44.204.0.44.204.0.47.60.0.47.204.0.47.252
10130 DIM#0.32.0.0.32.0.0.32.0.0.32.0.0.32.0.0.32.0.0.32.0.0.22.0.0
10134 DIM#0.10.0.3.249.0.49.56.0.68.248.0.51.56.0.51.56.0.249.0.51.248
10136 DIM#0.49.56.0.51.56.0.51.56.0.51.56.0.63.248.0.0.0.0.0.0.0.0.0.0.0.0.0
10138 DIM#0.0.0.0.0.0.0.0.0.0.0.0.
```

FORGET SOFTWARE
THINK TOUCHWARE



Simon's Shapes



Simon Says

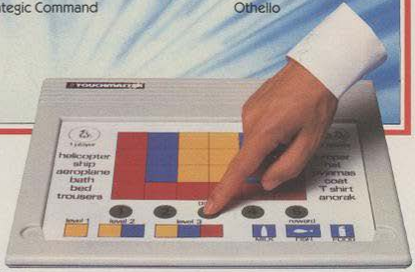
MultiSound Synthesiser

Dicky's Diamonds

Strategic Command

Othello

Graphics Editor



Simply Simon

An expanding range of totally new Touchware is now available for Touchmaster (software houses thoughout the UK and Europe are continuously adding to it). Due to the enhanced concept behind both Touchmaster and its Touchware, they combine to expand your use of the computer – dramatically and easily.

Experience the expanding range of Touchware – Arcade Games, Graphics packages, early education programs, Synthesiser, Board Games.

They all take on a new dimension with Touchmaster – some examples are shown above.

But they only hint at what you can do when you come to write your own programs with Touchmaster.

Complete and post the coupon for more details. Or telephone Teledata on 01-200 0200.

Now anyone can master the home computer

TOUCHMASTER

Touchmaster Limited, PO Box 3,
Port Talbot, West Glamorgan SA13 1WH.

More details on Touchmaster and Touchware please.

Name _____

Address _____

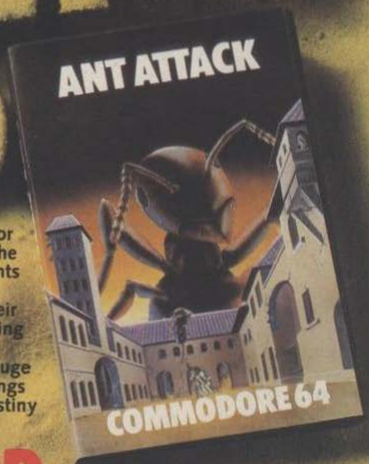
_____

_____ Post Code _____

YC11

They came from out of the desert to the lost city of Antescher and discovered the HORROR of the ANTS...

ANT ATTACK 3D



The Walled City of Antescher has rested for a thousand, thousand years in the midst of the Great Desert inhabited by only the deadly Ants who have made it their home.

Then one day He and She arrive to play their games through the wind-swept streets, ousting the Ants from their exclusive occupation.

But the City seems to have a presence, a huge brooding entity which hangs over the buildings and in some mysterious way controls the destiny of those below ...

ANT ATTACK 3D

Turbo load Commodore 64 £8.95

available from

QUICKSILVA

Quicksilva Mail Order, P.O. Box 6, Wimborne, Dorset BA21-7PY. Tel. (0202) 891744

Selected titles available at:
WHSMITH · Boots · WOOLWORTH · John Menzies
and leading multiple retailers and specialist computer stores.

SEE-SAW

COMMODORE 64
Turbo load
£7·95

COMMODORE 64
Turbo load £7·95 each

A GAME OF STRATEGY THAT WILL TEST YOUR MIND TO THE LIMIT!

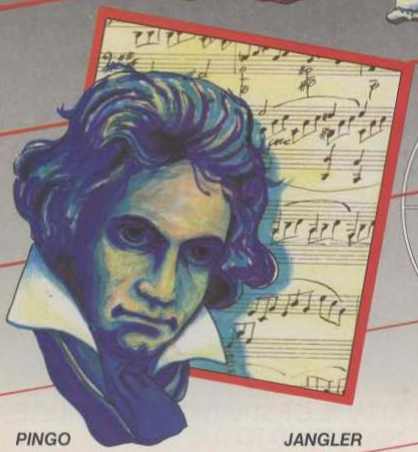
The Evil Castle Lord has trapped the members of the brotherhood in his castle. Only you, the Grand Master, can rescue them, but to do this you must vault the castle walls and unlock their cells...

QUICKSILVA

All titles available from Quicksilva Mail Order, PO Box 6, Wimborne Dorset BA21 7PY. Tel (0202) 891744.

For The First Time Ever

In England



PINGO

Battle in the ice maze with Pingo to destroy the Sno-bees. If you're fast enough you may survive!

ZX Spectrum 48k **5.95**

SPACE MISSILE COMMAND

Incoming waves of missiles and only you between the earth and destruction.

ZX Spectrum 48k **5.95**

JANGLER

A game for only the most skilful joystick adepts. Has to be experienced to be believed.

ZX Spectrum 48k **5.95**

MUSIC COMPOSER

- ★ *3 channel composer*
- ★ *professional musical notation*
- ★ *correct phrasing*
- ★ *5000 notes*
- ★ *music sheet scrolled across screen or printer*
- ★ *fully editable*
- ★ *synthesizer coming shortly*

ZX Spectrum 48k **6.95**

Available from your software dealer

profisoft

Dealer enquiries contact telex Germany 94966 profis d.

PROFISOFT GMBH, SUTTHAUSER STRAITE 50/52, 4500 OSNABRUECK, WEST GERMANY

(continued from page 176)

```
t that seek    to thwart your eff
orts. The      pestilent bees, th
e skulking     soap-bubbles and o
f course no    handiwork on dear
old Mrs.       Pritchetwood's win
dows."
8070 GO SUB 9500
8080 IF INKEY$()"" THEN GO TO 80
90: REM Press any key.
8085 GO TO 8080
8090 PAPER 0: INK 0: FOR n=6 TO
21: PRINT AT n,1; PAPER 0;"
                          ": NEXT
n
8100 PRINT AT 6,1;" The kind old
 lady offers £1    for each squa
re and £5 if you    manage to cov
er a crack."
8110 PRINT ""  Extra cash can be
 earned at     the bonus stage by
 reaching      the gold paint pot
 "
8120 PRINT ""  Collecting paint
pots will      replenish your bru
sh during      the game, but be t
hrifty,        the supply is limi
ted."
8130 PRINT ""  Fingers ready  3-
LEFT 4-RIGHT  TAB 17;"8-UP    U-D
OWN"
8140 GO SUB 9500
8500 RESTORE 9e3: FOR n=USR "a"
TO USR "n"
8510 READ s: POKE n,s: NEXT n
8520 PAUSE 0: RUN
9000 DATA 96,176,112,191,127,176
,112,160
9010 DATA 170,85,-1,126,24,s,s,s
9020 DATA 5,14,13,-2,-3,14,13,6
9030 DATA 24,s,s,s,126,-1,170,85
9040 DATA 127,s,s,0,-9,s,s,0
9050 DATA 36,24,219,-1,198,126,6
,189
9060 DATA 32,80,37,2,32,80,37,2
9070 DATA -1,127,97,s,s,127,s,97
9080 DATA -1,-2,134,s,s,-2,s,134
9090 DATA 97,s,s,s,s,s,127,-1
9100 DATA 134,s,s,s,s,s,-2,-1
9110 DATA 60,66,126,70,90,70,94,
126
9120 DATA 95,80,188,36,82,136,14
0,35,s
9140 DATA 5,13,14,-3,-2,13,14,5
9500 FLASH 1: INK 7: PRINT AT 0,
0;"
                    #1; FLASH 1;AT 0,0; PAPER 0
;"
  ": FOR n=1 TO 21: PRINT AT n,0
;":AT n,31;":": NEXT n: FLASH
0
9510 IF INKEY$()"" THEN GO TO 95
10
9520 FOR n=22721 TO 23231: IF n/
32=INT (n/32) AND (n+1)/32=INT
 (n+1)/32: THEN POKE n,135: BEE
P .001,30: POKE n,6
9530 IF INKEY$()"" THEN RETURN
 REM Dismiss instructions by
 pressing any key
9540 NEXT n
9550 RETURN
```

Chicks

Stuart Smalley,
Selby,
North Yorkshire.

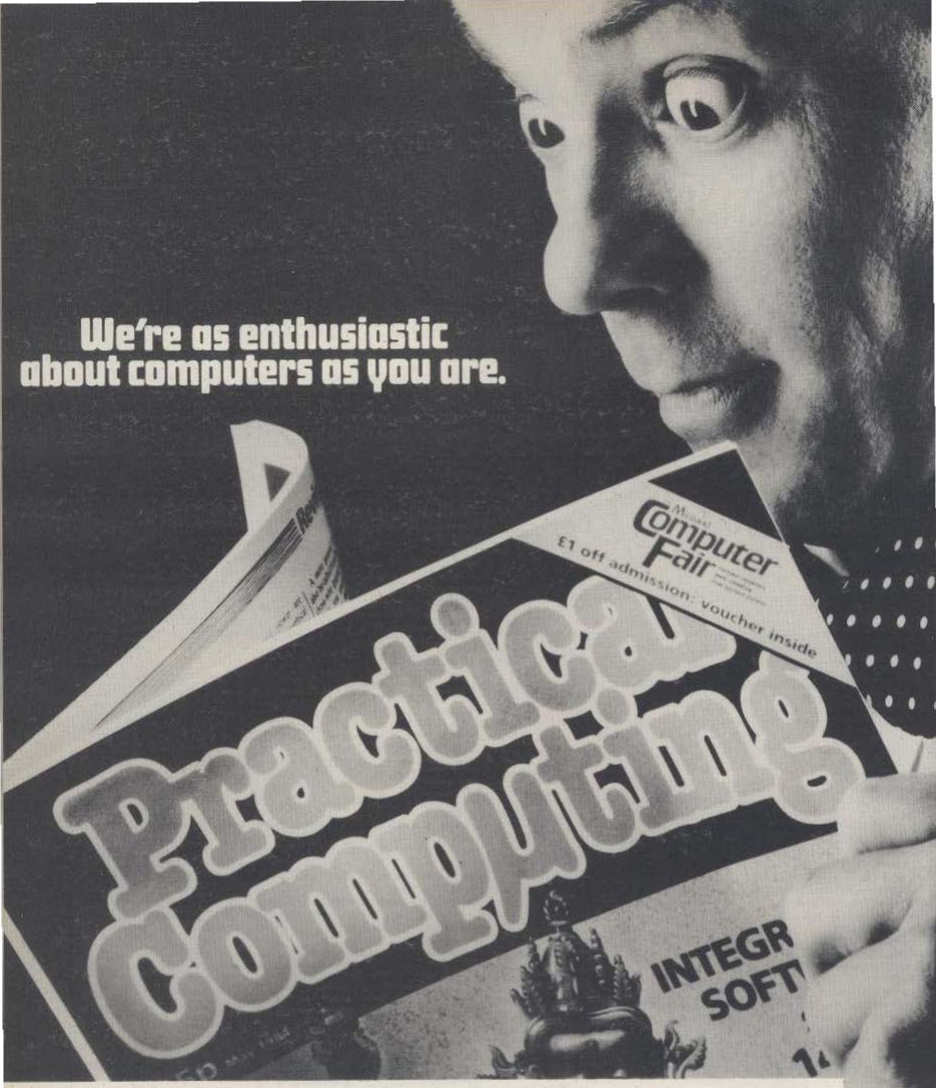
BBC

CHICKS IS FOR a model B BBC computer and involves directing a man about the screen by the use of the Z, X — left, right — and, ; ; / for up, down. The idea is to herd a flock of chicks into a chicken coop. The chicks always move away from the man but the man has moves at three times their speed.

The game can be speeded up by changing the multipland on line 140 or even by deleting the whole line.

```
  10REM (C) STUART SMALLEY.1984
  20ST%=0
  30DIM chicksx%(8),chicksy%(8)
  40MODE 7
  50PROCdifficulty
  60MODE1
  70PROCinitialise
  80REPEAT
  90PROCmove man
 100COLOUR1
 110PRINTTAB(coopx%-1,coopy%-1)CHR$130+CHR$131+CHR$13
2
 120COLOUR3
 130PRINTTAB(coopx%-1,coopy%)CHR$133+CHR$134+CHR$135
 140FORdelay%=1 TO (7-flock%)*30:NEXT
 150PROCmove man
 160PROCchicks
 170PROCmove man
 180UNTIL FALSE
 1000DEFPROCmove man
 1010X%=X%+(INKEY(-98) AND X%>0)-(INKEY(-67) AND X%<39
)
 1020Y%=Y%+(INKEY(-73) AND Y%>0)-(INKEY(-105) AND Y%<2
9)
 1030COLOUR1
 1040PRINTTAB(X%,Y%)CHR$128
 1050IF oldx%<>X% OR oldy%<>Y% THEN PRINTTAB(oldx%,old
y%)" "
 1060oldx%=X%:oldy%=Y%
 1070ENDPROC
 2000DEFPROCchicks
 2010SOUND1,1,200,1
 2020FORIX=1 TO flock%
 2030AX=chicksx%(IX):BX=chicksy%(IX)
 2040PROCmove chicks
 2050PRINTTAB(AX,BX)" "
 2060COLOUR2
 2070PRINTTAB(chicksx%(IX),chicksy%(IX))chick$
 2080IFchicksx%(IX)=coopx% AND chicksy%(IX)=coopy% THE
N PROCcooped
 2090NEXT
 2100ENDPROC
 3000DEFPROCmove chicks
 3010IF X%>chicksx%(IX) THEN chicksx%(IX)=chicksx%(IX)
-1:chick$=CHR$129 ELSE IF X%<chicksx%(IX) THEN chicksx
%(IX)=chicksx%(IX)+1:chick$=CHR$136
 3020IF Y%>chicksy%(IX) THEN chicksy%(IX)=chicksy%(IX)
-1 ELSE IF Y%<chicksy%(IX) THEN chicksy%(IX)=chicksy%(
IX)+1
 3030IF chicksx%(IX)<1 THEN chicksx%(IX)=RND(4) ELSE I
F chicksx%(IX)>37 THEN chicksx%(IX)=33+RND(4)
 3040IF chicksy%(IX)<1 THEN chicksy%(IX)=RND(4) ELSE I
F chicksy%(IX)>28 THEN chicksy%(IX)=24+RND(4)
 3050ENDPROC
 4000DEFPROCcooped
 4010flock%=flock%-1
 4020IF flock%=0 THEN PROCsuccess:ENDPROC ELSE FOR sou
nd%=50 TO 150 STEP 20:SOUND 1,-15,sound%,1:SOUND 2,-15
,sound%,1:SOUND 3,-15,sound%,1:NEXT
 4030FOR JX=IX TO flock%
 4040chicksx%(JX)=chicksx%(JX+1)
 4050chicksy%(JX)=chicksy%(JX+1)
 4060NEXT
 4070IX=JX
 4080ENDPROC
 5000DEFPROCsuccess
 5010time%=TIME DIV 100
 5020score%=25*difficulty%-time%
 5030difficulty%=difficulty%+1
 5040IF difficulty%>7 THEN difficulty%=7
 5050CLS
 5060PRINTTAB(5,8)"CONGRATULATIONS!!"
 5070PRINTTAB(0,12)"You captured all the chicks"
 5080IF score%>0 THEN PRINT"in ";time%;" seconds" ELSE
PRINT"But took too long!"
 5090PRINT''"You scored ";score%
 5100flock%=difficulty%
 5110IF score%>S% THEN S%=score%:PRINT''"You have the
highest score!"
 5120PROCfanfare
 5130PROCinitialise
 5140PRINT''''"PRESS <space> CONTINUE"
 5150REPEAT UNTIL INKEY(-99)
 5160CLS
 5170ENDPROC
 6000DEFPROCdifficulty
 6010FORIX=0 TO 9
 6020FORJX=0 TO 39 STEP 2
 6030PRINTTAB(JX,IX)CHR$(128+RND(7))+CHR$157
 6040NEXT
 6050SOUND1,-15,IX*10,1
 6060NEXT
 6070PRINTTAB(13,2)CHR$132+CHR$157+CHR$141+CHR$135+"CH
ICKS"
 6080PRINTTAB(13,3)CHR$132+CHR$157+CHR$141+CHR$135+"CH
ICKS"
 6090PRINTTAB(5,6)CHR$134+CHR$157+CHR$132+"(C) STUART
SMALLEY, 1984"
 6100PRINTTAB(0,11)"All the baby chicks have escaped a
nd    your job is to return them to the coop."
 6110PRINT"To do this you control a man who moves  by
 pressing:-"
 6120PRINT"';'=UP '/'=DOWN 'Z'=LEFT 'X'=RIGHT"
 6130PRINT"The chicks always move away from you."
 6140PRINT"PRESS KEYS 1-5 FOR LEVEL OF DIFFICULTY"
 6150REPEAT A$=GET$:UNTILINSTR("12345",A$)
 6160difficulty%=VAL(A$)+2
 6170ENDPROC
 7000DEFPROCfanfare
 7010FOR IX=1 TO 3
 7020FOR sound%=10 TO 150 STEP 15
 7030SOUND &201,-15,sound%,1
 7040SOUND &202,-15,sound%,1
 7050SOUND &203,-15,sound%,1
 7060NEXT
 7070NEXT
 7080FOR sound%=150 TO 10 STEP -15
 7090SOUND &201,-15,sound%,1
 7100SOUND &202,-15,sound%,1
 7110SOUND &203,-15,sound%,1
 7120NEXT
 7130ENDPROC
 8000DEFPROCinitialise
 8010FORIX=1 TO 8
 8020chicksx%(IX)=RND(30)
 8030chicksy%(IX)=RND(30)
 8040NEXT
```

(continued on page 183)



If you use computers at work or at home, Practical Computing magazine is essential reading. Every month it takes a long hard look at the most important issues in computing. It's informative, very useful and immensely readable.

It reviews both hardware and software, discusses the latest innovations and helps you get the most out of all the popular computers.

It's always entertaining, never dull. And it's at your newsagent now.

Practical Computing
At work. At home

(continued from page 181)

```
8050VDU23,128,24,60,24,60,126,219,24,54
8060VDU23,129,56,120,24,14,31,31,14,17
8070VDU23,130,0,0,0,0,1,3,7,15
8080VDU23,131,16,56,124,254,255,255,255,255
8090VDU23,132,0,0,0,0,0,128,192,224
8100VDU23,133,7,7,7,7,7,7,7,7
8110VDU23,134,255,255,199,191,131,131,131,131
8120VDU23,135,192,192,192,192,192,192,192,192
8130VDU23,136,28,30,24,112,248,248,112,144
8140VDU23;8202;0;0;0;
8150ENVELOPE 1,1,5,5,-10,30,30,30,50,0,0,1,100,100
8160flock%=difficulty%
8170chick%=CHR$129
8180oldx%=10:oldy%=10
8190XX=10:YX=10
8200coopx%=RND(20)+10:coopy%=RND(15)+10
8210TIME=0
8220ENDPROC
```

```
  1 LET H1=0
  2 LET LE=10
  3 LET L=1
  4 LET SCORE=0
  5 LET BALLS=7
  7 GOSUB 2000
  8 GOTO 1000
 10 FAST
 11 LET A=7
 12 FOR N=0 TO 42
 13 FOR F=0 TO (20+SGN (N/16))-
15
 14 PLOT N+10,F
 15 NEXT F
 16 NEXT N
 17 FOR F=0 TO 17
 18 FOR N=53 TO 63
 19 PLOT N,F
 20 NEXT N
 21 NEXT F
 22 FOR N=0 TO 19
 23 PLOT N,0
 24 NEXT N
 25 SLOW
 26 LET Z=INT (RND+3)+25
 27 LET U=9
 29 RETURN
 40 FAST
 50 FOR F=0 TO 63
 52 PLOT F,0
 53 NEXT F
 54 FOR N=0 TO 33
 55 FOR F=0 TO (22+20+SIN (N/32
+PI))-30
 56 PLOT N+16,F
 57 NEXT F
 58 NEXT N
 59 LET U=16
 60 LET Z=INT (RND+5)+23
 61 UNPLOT 32,12
 62 SLOW
 63 RETURN
 70 FAST
 71 CLS
 72 PRINT AT 5,0,"
                    "AT 21,0,"
                    "
 73 FOR F=10 TO 20
 74 FOR N=0 TO (RND+7)
 75 PRINT AT N+5,F,"■"AT 21-N,
30-F,"■"
 76 NEXT N
 77 NEXT F
 78 LET U=18
 79 LET Z=INT (RND+6)+21
 80 SLOW
 81 RETURN
 100 FAST
 101 CLS
 102 PRINT AT 21,0,"
                    "
 103 FOR F=10 TO 20 STEP 2
 104 FOR N=21 TO (RND+10)+5 STEP
-1
 105 PRINT AT N,F,"■"
 106 NEXT N
 107 NEXT F
 108 PRINT AT 19,12,"CARMEN"AT
19,14,"■ ■"AT 20,14,"■"AT 2
1,14,"■"
 109 LET U=18
 110 LET Z=INT (RND+5)+23
 111 SLOW
 112 RETURN
 120 FAST
 121 CLS
 132 PRINT AT 10,20,"
                    "
                    "AT 21,0,"
                    "
 133 FOR F=11 TO 21
 134 PRINT AT F,22,"
                    "
 135 NEXT F
 136 LET U=6
 137 LET Z=INT (RND+5)+20
 138 SLOW
 139 RETURN
 999 STOP
 1000 GOSUB LE
 1010 PRINT AT 0,0,"SCORE 0000 CA
STLE  BALLS"AT 0,10-LEN
 (STR$ SCORE),SCORE,AT 0,18;L;AT
 0,25,(("■■■■■■■■"( TO 7-BALLS))
 AND BALLS>0)+(" " AND BALLS=0)
 1011 PRINT AT U,Z,"■■■■■■■■"AT U+1
 ,Z+1,"■■■■■■■■"AT U+2,Z+1,"■■■■■■■■"AT U
+3,Z+1,"■■■■■■■■"
 1015 PRINT AT 19,0,"    "AT 20,0
,"■■■■■■■■"AT 21,0,"■■■■■■■■"
 1020 PRINT AT 2,0,"ANGLE OF ELEV
ATION ?
 1030 INPUT E
 1033 PRINT AT 20,0,("■■■■■■■■" AND E
>45)+("■■■■■■■■" AND E<45)AT 19,0,(
)+("■■■■■■■■" AND E>=4
5)
 1037 IF E>80 OR E<10 THEN GOTO 1
030
 1040 PRINT AT 2,0,"SPEED OF CANN
ON BALL?"
 1050 INPUT S
 1060 PRINT AT 2,0,"ELEVATION=";E
,"SPEED=";S
 1070 PRINT AT 4,0,"PRESS ""F""
 1080 IF INKEY$()"F" THEN GOTO 10
80
 1090 FOR F=0 TO 4
 1100 PRINT AT F,0,"
                    "
 1200 NEXT F
 1210 LET X=S*COS (PI*(E/180))
 1220 LET Y=S*SIN (PI*(E/180))
 1230 FOR F=0 TO Y/16
 1240 LET O=.01*(Y*F-16*F*F
 1250 IF X*F>8700 THEN GOTO 1400
 1260 IF O+5>40 THEN GOTO 1320
 1270 PLOT X*F/8,40-(O+5)
 1280 LET C=PEEK (PEEK 16395+256*
PEEK 16396)
 1300 IF C<10 THEN GOTO 1400
 1310 UNPLOT X*F/8,O+2
 1320 NEXT F
 1400 LET BALLS=BALLS-1
 1402 IF X*F>8700 THEN GOTO 1410
 1405 IF O+5<40 THEN UNPLOT X*F/
8,O+2
 1420 IF C=8 OR C=9 THEN LET LE=L
E+30
 1430 IF C=8 OR C=9 THEN PRINT AT
U,Z,"■■■■■■■■"AT U+1,Z,"■■■■■■■■"AT
U+2,Z,"■■■■■■■■"AT U,Z,"■■■■■■■■"AT
U+1,Z,"■■■■■■■■"AT U+2,Z,"
                    "
 1440 IF C=8 OR C=9 THEN LET L=L+
1
 1441 IF C=8 OR C=9 THEN LET SCOR
E=SCORE+255
 1442 IF LE>160 THEN GOTO 3000
 1443 IF BALLS=0 THEN GOTO 2000
 1445 IF O<5 AND C<9 THEN GOTO
1010
 1446 FOR F=0 TO 50
 1447 NEXT F
 1450 CLS
```

Castles of Carmain

John Wood,
Wednesbury,
West Midlands.

ZX-81

THIS IS A PROGRAM for the 16K ZX-81 called the Castles of Carmain. All the castles must be destroyed by typing in the angle of elevation, followed by the velocity of the cannon ball.

The castles appear randomly on each game but are always possible to hit. The cave is also drawn randomly.

```
 1450 GOTO 1000
 2000 IF SCORE>HI THEN LET HI=SCO
RE
 2009 PRINT AT 2,0,"NO CANNONBALL
S LEFT ■ TO REPLAY","HI SCORE=";
HI
 2010 IF INKEY$="" THEN GOTO 2010
 2020 IF INKEY$="P" THEN GOTO 2
 2030 STOP
 2040 SAVE "CASTLE■"
 2050 RUN
 3000 CLS
 3010 FOR F=0 TO 21
 3020 PRINT TAB F;"WELL DONE"
 3030 NEXT F
 3040 PRINT AT 0,20,"■■■■■■■■"AT 1,2
0,"■■■■■■■■"AT 2,20,"■■■■■■■■"AT 3,20,
"■■■■■■■■"
 3050 PRINT AT 18,0,"■■■■■■■■"AT 19,
0,"■■■■■■■■"AT 20,0,"■■■■■■■■"AT 21,0,
"■■■■■■■■"
 3060 PRINT AT 11,0,"
                    "
 3069 PRINT "HI=";"SCORE=";SCOR
E
 3070 IF SCORE>HI THEN LET HI=SCO
RE
 3080 PRINT HI
 3090 PRINT "■■ TO REPLAY ANY OT
HER KEY TO STOP"
 3100 GOTO 2010
 9000 CLS
 9010 PRINT AT 0,0,"THE CASTLES O
F CARMEIN",,,"USING YOUR TRUSTY
CANNON YOU   MUST DESTROY ALL T
HE CASTLES   SURROUNDING THE CI
TY OF CARMEIN.FIRST ENTER THE AN
GLE OF THE   CANNON THEN THE SP
EED OF THE   BALL.ALTHOUGH THE
CASTLES      APPEAR IN SLIGHTLY
 DIFFERENT   POSITIONS EACH GAM
E IT WILL    ALWAYS BE POSSIBLE
TO HIT THEM  THE ANGLE OF ELEVA
TION MUST    BE GREATER THAN 10
 NOT EXCEEDING80 DEGREES.IT IS P
OSSIBLE TO   SHOOT A BALL OFF T
HE SCREEN AT A HIGH ANGLE AND H
IT A CASTLE  ON THE BALLS DESCE
NT.
 9020 PRINT AT 21,7;"PRESS NEWLIN
E"
 9030 IF INKEY$()CHR$ 118 THEN GO
TO 9030
 9040 CLS
 9050 RETURN
```

Subhunt

Mark Stewart,
Balerno,
Edinburgh.

ORIC

SUBHUNT IS WRITTEN in machine code and it runs on the Oric-1 or Atmos 16K or 48K. The Atmos version has no sound.

The first program enables you to type in the code — program 2. Program 3 is the Basic controller program.

You have to guide a frogman through enemy waters to plant mines on the hulls of ships. The enemy has laid mines which you have to avoid and have filled the waters with mutant jellyfish and cloned sharks. Use A for up, Z for down and space bar to plant a mine.

48K owners must add:

4 POKE 8960,76:DOKE 8961, #A300

I can supply it on cassette for £3. Send a cheque to Mark Stewart, 12 Whitelea Road.

Program 1.

```
#EBC
10 CLS
20 INPUT"ENTER START ADDRESS ";ST
30 PRINT"ENTER 'STOP' TO END."
40 PRINT
50 PRINTHEX$(ST);":";:INPUTA$
55 IFA$="STOP"THENSTOP   )
60 V=VAL(A$):POKEST,V
70 ST=ST+1
80 GOTO50
```

Program 2.

```
:CVB #20,#00,#A6,#EA,#20,#00,#85,#EA
:CBO0 #20,#00,#A4,#EA,#20,#00,#A6,#EA
:CB08 #20,#A8,#2F,#EA,#20,#C5,#32,#EA
:CB10 #20,#10,#28,#A6,#FC,#F4,#AD,#08
:CB18 #02,#C9,#84,#F0,#01,#A6,#20,#1B
:CB20 #F4,#A6,#FD,#76,#4E,#E2,#CA,#2A
:CB28 #2C,#2F,#47,#4B,#55,#B5,#7D,#F7
:CB30 #BC,#D8,#CF,#5C,#AD,#08,#02,#C9
:CB38 #3B,#F0,#01,#A6,#A9,#A4,#8D,#08
:CB40 #02,#20,#A6,#2F,#A6,#A1,#4B,#E1
:CB48 #20,#F8,#2A,#EA,#20,#FD,#34,#20
:CB50 #F8,#2A,#20,#FD,#34,#A6,#EA,#20
:CB58 #34,#2B,#A6,#D8,#92,#5F,#E3,#3A
:CB60 #D6,#37,#2F,#E0,#02,#02,#7F,#0C
:CB68 #B0,#A3,#76,#2A,#32,#78,#72,#E7
:CB70 #7C,#B4,#6B,#4F,#0C,#94,#97,#A5
:CB78 #A4,#8E,#05,#55,#91,#AF,#3A,#4A
:CB80 #47,#A3,#F4,#B5,#9A,#52,#6B,#10
:CB88 #B4,#F1,#A6,#8B,#E2,#3B,#97,#F9
:CB90 #9D,#D2,#8E,#8B,#CC,#8B,#8B,#30
:CB98 #AD,#24,#A6,#A6,#A9,#2C,#92,#77
:CBA0 #AD,#05,#70,#76,#B0,#5E,#59,#A9
:CBA8 #15,#B6,#74,#04,#B0,#B7,#2B,#96
:CBB0 #B6,#09,#FA,#38,#74,#44,#91,#02
```

(continued on next page)

(continued from previous page)

```
#2B80 8A0,8C8,808,829,44A,850,861,8A5
#2B90 872,882,806,8DD,857,82F,83A,8D1
#2BA0 829,846,898,8F0,898,8D8,8F1,8B0
#2BB0 860,857,80E,808,865,845,840,88D
#2BC0 825,809,852,83E,878,8F2,8BE,868
#2BD0 885,889,883,884,820,852,877,8DA
#2BE0 896,82F,87F,80A,840,89F,82E,8DF
#2BF0 875,899,8FD,88E,888,8A7,8B0,883
#2C00 88D,8F7,82F,899,88D,80E,8F1,88C
#2C10 85F,851,82E,898,8E3,808,825,8D6
#2C20 8A1,806,88F,899,8AC,848,8EC,8D1
#2C30 871,81C,8F0,811,838,848,870,80E
#2C40 865,88E,802,808,840,824,8EF,822
#2C50 865,8F6,854,856,8E5,814,871,806
#2C60 81B,83E,854,853,8D6,870,83C,805
#2C70 864,8F0,888,827,8CF,843,888,880
#2C80 849,8AD,8CB,878,838,8C2,842,8AD
#2C90 842,8D3,840,873,808,8D7,8F2,8EC
#2CA0 842,87B,8D6,838,853,807,8CB,860
#2CB0 8A6,8AF,8F4,830,8A0,809,8F2,898
#2CC0 885,8FA,871,885,885,872,805,846
#2CD0 8F7,8EF,81F,800,888,8BC,8B7,8C1
#2CE0 844,894,8D6,8D3,898,8B8,8D1,8A7
#2CF0 8F1,886,88F,808,852,840,883,8FE
#2D00 80F,884,882,855,896,82E,8CF
#2D10 8D4,846,881,8B6,8D8,8C4,8F2,8CC
#2D20 842,8D3,840,873,808,8D7,8F2,8EC
#2D30 842,87B,8D6,838,853,807,8CB,860
#2D40 8A6,8AF,8F4,830,8A0,809,8F2,898
#2D50 885,8FA,871,885,885,872,805,846
#2D60 8F7,8EF,81F,800,888,8BC,8B7,8C1
#2D70 844,894,8D6,8D3,898,8B8,8D1,8A7
#2D80 8F1,886,88F,808,852,840,883,8FE
#2D90 80F,884,882,855,896,82E,8CF
#2DA0 8D4,846,881,8B6,8D8,8C4,8F2,8CC
#2DB0 842,8D3,840,873,808,8D7,8F2,8EC
#2DC0 842,87B,8D6,838,853,807,8CB,860
#2DD0 8A6,8AF,8F4,830,8A0,809,8F2,898
#2DE0 885,8FA,871,885,885,872,805,846
#2DF0 8F7,8EF,81F,800,888,8BC,8B7,8C1
#2E00 844,894,8D6,8D3,898,8B8,8D1,8A7
#2E10 8F1,886,88F,808,852,840,883,8FE
#2E20 80F,884,882,855,896,82E,8CF
#2E30 8A6,883,8C5,828,849,8BC,8F0,889
#2E40 832,854,887,840,88B,896,84E,88C
#2E50 833,8BA,875,861,849,860,8DE,838
#2E60 840,8A7,8F4,8F7,876,812,8F4,839
#2E70 838,8DF,8E4,851,888,8B0,802,84A
#2E80 8E7,819,84A,86C,834,808,805,803
#2E90 835,8E6,88F,8F6,851,88F,816,800
#2EA0 857,859,850,885,857,873,8CD,899
#2EB0 889,894,832,813,86A,824,831,8CF
#2EC0 835,8F0,857,840,852,860,84A,888
#2ED0 88B,8E7,855,85F,884,8D5,85C,8C4
#2EE0 842,8F0,8F6,867,8C0,897,880,882
#2EF0 84A,8F0,8F6,867,8C0,897,880,882
#2F00 8A6,8D0,8D0,8CE,808,843,90E,95E,930
#2F10 8D7,8D7,8D7,8D7,8D7,8D7,8D7,8D7
#2F20 8B0,848,81D,8EB,8F7,829,884,8CB
#2F30 829,819,81C,878,801,8AF,805,8E4
#2F40 8E8,8B7,8F8,8D5,8D5,8D5,8D5,8D5
#2F50 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2F60 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2F70 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2F80 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2F90 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2FA0 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2FB0 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2FC0 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2FD0 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2FE0 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#2FF0 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#3000 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#3010 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#3020 850,8AE,811,804,860,802,8F0,805
#3030 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#3040 8D5,8D5,8D5,8D5,8D5,8D5,8D5,8D5
#3050 860,8CB,80C,804,804,84C,8D0,8F
#3060 8D0,8F7,84C,804,804,8D0,803,84C
#3070 84C,804,804,881,802,8C9,821,830
#3080 830,830,830,830,830,830,830,830
#3090 804,804,881,802,8C9,821,830,830
#30A0 830,830,830,830,830,830,830,830
#30B0 830,830,84C,8C0,830,84C,8D0,82
#30C0 8A2,88E,804,804,860,860,848
#30D0 8AD,85A,848,835,818,8A9,829,8A5
#30E0 8A9,829,8A5,829,8A9,829,8A5,829
#30E0 8A9,829,8A5,829,8A9,829,8A5,829
#30F0 830,881,802,8C9,8A4,8D0,803,84C
#3100 84C,881,8C8,881,802,8C9,848,880
#3110 8C1,830,8AC,804,804,881,802,8C9
#3120 8A2,88E,804,804,860,860,848
#3130 881,8C8,881,802,8C9,8A2,88E
#3140 881,802,84C,8D0,832,860,84C,804
#3150 829,875,831,8AC,804,804,829,820
#3160 829,875,831,8AC,804,804,829,820
#3170 829,875,831,8AC,804,804,829,820
#3180 829,875,831,8AC,804,804,829,820
#3190 829,875,831,8AC,804,804,829,820
#31A0 829,875,831,8AC,804,804,829,820
#31B0 829,875,831,8AC,804,804,829,820
#31C0 829,875,831,8AC,804,804,829,820
#31D0 829,875,831,8AC,804,804,829,820
#31E0 829,875,831,8AC,804,804,829,820
#31F0 829,875,831,8AC,804,804,829,820
#3200 829,875,831,8AC,804,804,829,820
#3210 829,875,831,8AC,804,804,829,820
#3220 829,875,831,8AC,804,804,829,820
#3230 829,875,831,8AC,804,804,829,820
#3240 829,875,831,8AC,804,804,829,820
#3250 829,875,831,8AC,804,804,829,820
#3260 829,875,831,8AC,804,804,829,820
#3270 829,875,831,8AC,804,804,829,820
#3280 829,875,831,8AC,804,804,829,820
#3290 829,875,831,8AC,804,804,829,820
#32A0 829,875,831,8AC,804,804,829,820
#32B0 829,875,831,8AC,804,804,829,820
#32C0 829,875,831,8AC,804,804,829,820
#32D0 829,875,831,8AC,804,804,829,820
#32E0 829,875,831,8AC,804,804,829,820
#32F0 829,875,831,8AC,804,804,829,820
#3300 829,875,831,8AC,804,804,829,820
#3310 829,875,831,8AC,804,804,829,820
#3320 829,875,831,8AC,804,804,829,820
#3330 829,875,831,8AC,804,804,829,820
#3340 829,875,831,8AC,804,804,829,820
#3350 829,875,831,8AC,804,804,829,820
#3360 829,875,831,8AC,804,804,829,820
#3370 829,875,831,8AC,804,804,829,820
#3380 829,875,831,8AC,804,804,829,820
#3390 829,875,831,8AC,804,804,829,820
#33A0 829,875,831,8AC,804,804,829,820
#33B0 829,875,831,8AC,804,804,829,820
#33C0 829,875,831,8AC,804,804,829,820
#33D0 829,875,831,8AC,804,804,829,820
#33E0 829,875,831,8AC,804,804,829,820
#33F0 829,875,831,8AC,804,804,829,820
#3400 829,875,831,8AC,804,804,829,820
#3410 829,875,831,8AC,804,804,829,820
#3420 829,875,831,8AC,804,804,829,820
#3430 829,875,831,8AC,804,804,829,820
#3440 829,875,831,8AC,804,804,829,820
#3450 829,875,831,8AC,804,804,829,820
#3460 829,875,831,8AC,804,804,829,820
#3470 829,875,831,8AC,804,804,829,820
#3480 829,875,831,8AC,804,804,829,820
#3490 829,875,831,8AC,804,804,829,820
#34A0 829,875,831,8AC,804,804,829,820
#34B0 829,875,831,8AC,804,804,829,820
#34C0 829,875,831,8AC,804,804,829,820
#34D0 829,875,831,8AC,804,804,829,820
#34E0 829,875,831,8AC,804,804,829,820
#34F0 829,875,831,8AC,804,804,829,820
#3500 829,875,831,8AC,804,804,829,820
#3510 829,875,831,8AC,804,804,829,820
#3520 829,875,831,8AC,804,804,829,820
#3530 829,875,831,8AC,804,804,829,820
#3540 829,875,831,8AC,804,804,829,820
#3550 829,875,831,8AC,804,804,829,820
#3560 829,875,831,8AC,804,804,829,820
#3570 829,875,831,8AC,804,804,829,820
#3580 829,875,831,8AC,804,804,829,820
#3590 829,875,831,8AC,804,804,829,820
#35A0 829,875,831,8AC,804,804,829,820
#35B0 829,875,831,8AC,804,804,829,820
#35C0 829,875,831,8AC,804,804,829,820
#35D0 829,875,831,8AC,804,804,829,820
#35E0 829,875,831,8AC,804,804,829,820
#35F0 829,875,831,8AC,804,804,829,820
#3600 829,875,831,8AC,804,804,829,820
#3610 829,875,831,8AC,804,804,829,820
#3620 829,875,831,8AC,804,804,829,820
#3630 829,875,831,8AC,804,804,829,820
#3640 829,875,831,8AC,804,804,829,820
#3650 829,875,831,8AC,804,804,829,820
#3660 829,875,831,8AC,804,804,829,820
#3670 829,875,831,8AC,804,804,829,820
#3680 829,875,831,8AC,804,804,829,820
#3690 829,875,831,8AC,804,804,829,820
#36A0 829,875,831,8AC,804,804,829,820
#36B0 829,875,831,8AC,804,804,829,820
#36C0 829,875,831,8AC,804,804,829,820
#36D0 829,875,831,8AC,804,804,829,820
#36E0 829,875,831,8AC,804,804,829,820
#36F0 829,875,831,8AC,804,804,829,820
#3700 829,875,831,8AC,804,804,829,820
#3710 829,875,831,8AC,804,804,829,820
#3720 829,875,831,8AC,804,804,829,820
#3730 829,875,831,8AC,804,804,829,820
#3740 829,875,831,8AC,804,804,829,820
#3750 829,875,831,8AC,804,804,829,820
#3760 829,875,831,8AC,804,804,829,820
#3770 829,875,831,8AC,804,804,829,820
#3780 829,875,831,8AC,804,804,829,820
#3790 829,875,831,8AC,804,804,829,820
#37A0 829,875,831,8AC,804,804,829,820
#37B0 829,875,831,8AC,804,804,829,820
#37C0 829,875,831,8AC,804,804,829,820
#37D0 829,875,831,8AC,804,804,829,820
#37E0 829,875,831,8AC,804,804,829,820
#37F0 829,875,831,8AC,804,804,829,820
#3800 829,875,831,8AC,804,804,829,820
#3810 829,875,831,8AC,804,804,829,820
#3820 829,875,831,8AC,804,804,829,820
#3830 829,875,831,8AC,804,804,829,820
#3840 829,875,831,8AC,804,804,829,820
#3850 829,875,831,8AC,804,804,829,820
#3860 829,875,831,8AC,804,804,829,820
#3870 829,875,831,8AC,804,804,829,820
#3880 829,875,831,8AC,804,804,829,820
#3890 829,875,831,8AC,804,804,829,820
#38A0 829,875,831,8AC,804,804,829,820
#38B0 829,875,831,8AC,804,804,829,820
#38C0 829,875,831,8AC,804,804,829,820
#38D0 829,875,831,8AC,804,804,829,820
#38E0 829,875,831,8AC,804,804,829,820
#38F0 829,875,831,8AC,804,804,829,820
#3900 829,875,831,8AC,804,804,829,820
#3910 829,875,831,8AC,804,804,829,820
#3920 829,875,831,8AC,804,804,829,820
#3930 829,875,831,8AC,804,804,829,820
#3940 829,875,831,8AC,804,804,829,820
#3950 829,875,831,8AC,804,804,829,820
#3960 829,875,831,8AC,804,804,829,820
#3970 829,875,831,8AC,804,804,829,820
#3980 829,875,831,8AC,804,804,829,820
#3990 829,875,831,8AC,804,804,829,820
#39A0 829,875,831,8AC,804,804,829,820
#39B0 829,875,831,8AC,804,804,829,820
#39C0 829,875,831,8AC,804,804,829,820
#39D0 829,875,831,8AC,804,804,829,820
#39E0 829,875,831,8AC,804,804,829,820
#39F0 829,875,831,8AC,804,804,829,820
#3A00 829,875,831,8AC,804,804,829,820
#3A10 829,875,831,8AC,804,804,829,820
#3A20 829,875,831,8AC,804,804,829,820
#3A30 829,875,831,8AC,804,804,829,820
#3A40 829,875,831,8AC,804,804,829,820
#3A50 829,875,831,8AC,804,804,829,820
#3A60 829,875,831,8AC,804,804,829,820
#3A70 829,875,831,8AC,804,804,829,820
#3A80 829,875,831,8AC,804,804,829,820
#3A90 829,875,831,8AC,804,804,829,820
#3AA0 829,875,831,8AC,804,804,829,820
#3AB0 829,875,831,8AC,804,804,829,820
#3AC0 829,875,831,8AC,804,804,829,820
#3AD0 829,875,831,8AC,804,804,829,820
#3AE0 829,875,831,8AC,804,804,829,820
#3AF0 829,875,831,8AC,804,804,829,820
#3B00 829,875,831,8AC,804,804,829,820
#3B10 829,875,831,8AC,804,804,829,820
#3B20 829,875,831,8AC,804,804,829,820
#3B30 829,875,831,8AC,804,804,829,820
#3B40 829,875,831,8AC,804,804,829,820
#3B50 829,875,831,8AC,804,804,829,820
#3B60 829,875,831,8AC,804,804,829,820
#3B70 829,875,831,8AC,804,804,829,820
#3B80 829,875,831,8AC,804,804,829,820
#3B90 829,875,831,8AC,804,804,829,820
#3BA0 829,875,831,8AC,804,804,829,820
#3BB0 829,875,831,8AC,804,804,829,820
#3BC0 829,875,831,8AC,804,804,829,820
#3BD0 829,875,831,8AC,804,804,829,820
#3BE0 829,875,831,8AC,804,804,829,820
#3BF0 829,875,831,8AC,804,804,829,820
#3C00 829,875,831,8AC,804,804,829,820
#3C10 829,875,831,8AC,804,804,829,820
#3C20 829,875,831,8AC,804,804,829,820
#3C30 829,875,831,8AC,804,804,829,820
#3C40 829,875,831,8AC,804,804,829,820
#3C50 829,875,831,8AC,804,804,829,820
#3C60 829,875,831,8AC,804,804,829,820
#3C70 829,875,831,8AC,804,804,829,820
#3C80 829,875,831,8AC,804,804,829,820
#3C90 829,875,831,8AC,804,804,829,820
#3CA0 829,875,831,8AC,804,804,829,820
#3CB0 829,875,831,8AC,804,804,829,820
#3CC0 829,875,831,8AC,804,804,829,820
#3CD0 829,875,831,8AC,804,804,829,820
#3CE0 829,875,831,8AC,804,804,829,820
#3CF0 829,875,831,8AC,804,804,829,820
#3D00 829,875,831,8AC,804,804,829,820
#3D10 829,875,831,8AC,804,804,829,820
#3D20 829,875,831,8AC,804,804,829,820
#3D30 829,875,831,8AC,804,804,829,820
#3D40 829,875,831,8AC,804,804,829,820
#3D50 829,875,831,8AC,804,804,829,820
#3D60 829,875,831,8AC,804,804,829,820
#3D70 829,875,831,8AC,804,804,829,820
#3D80 829,875,831,8AC,804,804,829,820
#3D90 829,875,831,8AC,804,804,829,820
#3DA0 829,875,831,8AC,804,804,829,820
#3DB0 829,875,831,8AC,804,804,829,820
#3DC0 829,875,831,8AC,804,804,829,820
#3DD0 829,875,831,8AC,804,804,829,820
#3DE0 829,875,831,8AC,804,804,829,820
#3DF0 829,875,831,8AC,804,804,829,820
#3E00 829,875,831,8AC,804,804,829,820
#3E10 829,875,831,8AC,804,804,829,820
#3E20 829,875,831,8AC,804,804,829,820
#3E30 829,875,831,8AC,804,804,829,820
#3E40 829,875,831,8AC,804,804,829,820
#3E50 829,875,831,8AC,804,804,829,820
#3E60 829,875,831,8AC,804,804,829,820
#3E70 829,875,831,8AC,804,804,829,820
#3E80 829,875,831,8AC,804,804,829,820
#3E90 829,875,831,8AC,804,804,829,820
#3EA0 829,875,831,8AC,804,804,829,820
#3EB0 829,875,831,8AC,804,804,829,820
#3EC0 829,875,831,8AC,804,804,829,820
#3ED0 829,875,831,8AC,804,804,829,820
#3EE0 829,875,831,8AC,804,804,829,820
#3EF0 829,875,831,8AC,804,804,829,820
#3F00 829,875,831,8AC,804,804,829,820
#3F10 829,875,831,8AC,804,804,829,820
#3F20 829,875,831,8AC,804,804,829,820
#3F30 829,875,831,8AC,804,804,829,820
#3F40 829,875,831,8AC,804,804,829,820
#3F50 829,875,831,8AC,804,804,829,820
#3F60 829,875,831,8AC,804,804,829,820
#3F70 829,875,831,8AC,804,804,829,820
#3F80 829,875,831,8AC,804,804,829,820
#3F90 829,875,831,8AC,804,804,829,820
#3FA0 829,875,831,8AC,804,804,829,820
#3FB0 829,875,831,8AC,804,804,829,820
#3FC0 829,875,831,8AC,804,804,829,820
#3FD0 829,875,831,8AC,804,804,829,820
#3FE0 829,875,831,8AC,804,804,829,820
#3FF0 829,875,831,8AC,804,804,829,820
#4000 829,875,831,8AC,804,804,829,820
#4010 829,875,831,8AC,804,804,829,820
#4020 829,875,831,8AC,804,804,829,820
#4030 829,875,831,8AC,804,804,829,820
#4040 829,875,831,8AC,804,804,829,820
#4050 829,875,831,8AC,804,804,829,820
#4060 829,875,831,8AC,804,804,829,820
#4070 829,875,831,8AC,804,804,829,820
#4080 829,875,831,8AC,804,804,829,820
#4090 829,875,831,8AC,804,804,829,820
#40A0 829,875,831,8AC,804,804,829,820
#40B0 829,875,831,8AC,804,804,829,820
#40C0 829,875,831,8AC,804,804,829,820
#40D0 829,875,831,8AC,804,804,829,820
#40E0 829,875,831,8AC,804,804,829,820
#40F0 829,875,831,8AC,804,804,829,820
#4100 829,875,831,8AC,804,804,829,820
#4110 829,875,831,8AC,804,804,829,820
#4120 829,875,831,8AC,804,804,829,820
#4130 829,875,831,8AC,804,804,829,820
#4140 829,875,831,8AC,804,804,829,820
#4150 829,875,831,8AC,804,804,829,820
#4160 829,875,831,8AC,804,804,829,820
#4170 829,875,831,8AC,804,804,829,820
#4180 829,875,831,8AC,804,804,829,820
#4190 829,875,831,8AC,804,804,829,820
#41A0 829,875,831,8AC,804,804,829,820
#41B0 829,875,831,8AC,804,804,829,820
#41C0 829,875,831,8AC,804,804,829,820
#41D0 829,875,831,8AC,804,804,829,820
#41E0 829,875,831,8AC,804,804,829,820
#41F0 829,875,831,8AC,804,804,829,820
#4200 829,875,831,8AC,804,804,829,820
#4210 829,875,831,8AC,804,804,829,820
#4220 829,875,831,8AC,804,804,829,820
#4230 829,875,831,8AC,804,804,829,820
#4240 829,875,831,8AC,804,804,829,820
#4250 829,875,831,8AC,804,804,829,820
#4260 829,875,831,8AC,804,804,829,820
#4270 829,875,831,8AC,804,804,829,820
#4280 829,875,831,8AC,804,804,829,820
#4290 829,875,831,8AC,804,804,829,820
#42A0 829,875,831,8AC,804,804,829,820
#42B0 829,875,831,8AC,804,804,829,820
#42C0 829,875,831,8AC,804,804,829,820
#42D0 829,875,831,8AC,804,804,829,820
#42E0 829,875,831,8AC,804,804,829,820
#42F0 829,875,831,8AC,804,804,829,820
#4300 829,875,831,8AC,804,804,829,820
#4310 829,875,831,8AC,804,804,829,820
#4320 829,875,831,8AC,804,804,829,820
#4330 829,875,831,8AC,804,804,829,820
#4340 829,875,831,8AC,804,804,829,820
#4350 829,875,831,8AC,804,804,829,820
#4360 829,875,831,8AC,804,804,829,820
#4370 829,875,831,8AC,804,804,829,820
#4380 829,875,831,8AC,804,804,829,820
#4390 829,875,831,8AC,804,804,829,820
#43A0 829,875,831,8AC,804,804,829,820
#43B0 829,875,831,8AC,804,804,829,820
#43C0 829,875,831,8AC,804,804,829,820
#43D0 829,875,831,8AC,804,804,829,820
#43E0 829,875,831,8AC,804,804,829,820
#43F0 829,875,831,8AC,804,804,829,820
#4400 829,875,831,8AC,804,804,829,820
#4410 829,875,831,8AC,804,804,829,820
#4420 829,875,831,8AC,804,804,829,820
#4430 829,875,831,8AC,804,804,829,820
#4440 829,875,831,8AC,804,804,829,820
#4450 829,875,831,8AC,804,804,829,820
#4460 829,875,831,8AC,804,804,829,820
#4470 829,875,831,8AC,804,804,829,820
#4480 829,875,831,8AC,804,804,829,820
#4490 829,875,831,8AC,804,804,829,820
#44A0 829,875,831,8AC,804,804,829,820
#44B0 829,875,831,8AC,804,804,829,820
#44C0 829,875,831,8AC,804,804,829,820
#44D0 829,875,831,8AC,804,804,829,820
#44E0 829,875,831,8AC,804,804,829,820
#44F0 829,875,831,8AC,804,804,829,820
#4500 829,875,831,8AC,804,804,829,820
#4510 829,875,831,8AC,804,804,829,820
#4520 829,875,831,8AC,804,804,829,820
#4530 829,875,831,8AC,804,804,829,820
#4540 829,875,831,8AC,804,804,829,820
#4550 829,875,831,8AC,804,804,829,820
#4560 829,875,831,8AC,804,804,829,820
#4570 829,875,831,8AC,804,804,829,820
#4580 829,875,831,8AC,804,804,829,820
#4590 829,875,831,8AC,804,804,829,820
#45A0 829,875,831,8AC,804,804,829,820
#45B0 829,875,831,8AC,804,804,829,820
#45C0 829,875,831,8AC,804,804,829,820
#45D0 829,875,831,8AC,804,804,829,820
#45E0 829,875,831,8AC,804,804,829,820
#45F0 829,875,831,8AC,804,804,829,820
#4600 829,875,831,8AC,804,804,829,820
#4610 829,875,831,8AC,804,804,829,820
#4620 829,875,831,8AC,804,804,829,820
#4630 829,875,831,8AC,804,804,829,820
#4640 829,875,831,8AC,804,804,829,820
#4650 829,875,831,8AC,804,804,829,820
#4660 829,875,831,8AC,804,804,829,820
#4670 829,875,831,8AC,804,804,829,820
#4680 829,875,831,8AC,804,804,829,820
#4690 829,875,831,8AC,804,804,829,820
#46A0 829,875,831,8AC,804,804,829,820
#46B0 829,875,831,8AC,804,804,829,820
#46C0 829,875,831,8AC,804,804,829,820
#46D0 829,875,831,8AC,804,804,829,820
#46E0 829,875,831,8AC,804,804,829,820
#46F0 829,875,831,8AC,804,804,829,820
#4700 829,875,831,8AC,804,804,829,820
#4710 829,875,831,8AC,804,804,829,820
#4720 829,875,831,8AC,804,804,829,820
#4730 829,875,831,8AC,804,804,829,820
#4740 829,875,831,8AC,804,804,829,820
#4750 829,875,831,8AC,804,804,829,820
#4760 829,875,831,8AC,804,804,829,820
#4770 829,875,831,8AC,804,804,829,820
#4780 829,875,831,8AC,804,804,829,820
#4790 829,875,831,8AC,804,804,829,820
#47A0 829,875,831,8AC,804,804,829,820
#47B0 829,875,831,8AC,804,804,829,820
#47C0 829,875,831,8AC,804,804,829,820
#47D0 829,875,831,8AC,804,804,829,820
#47E0 829,875,831,8AC,804,804,829,820
#47F0 829,875,831,8AC,804,804,829,820
#4800 829,875,831,8AC,804,804,829,820
#4810 829,875,831,8AC,804,804,829,820
#4820 829,875,831,8AC,804,804,829,820
#4830 829,875,831,8AC,804,804,829,820
#4840 829,875,831,8AC,804,804,829,820
#4850 829,875,831,8AC,804,804,829,820
#4860 829,875,831,8AC,804,804,829,820
#4870 829,875,831,8AC,804,804,829,820
#4880 829,875,831,8AC,804,804,829,820
#4890 829,875,831,8AC,804,804,829,820
#48A0 829,875,831,8AC,804,804,829,820
#48B0 829,875,831,8AC,804,804,829,820
#48C0 829,875,831,8AC,804,804,829,820
#48D0 829,875,831,8AC,804,804,829,820
#48E0 829,875,831,8AC,804,804,829,820
#48F0 829,875,831,8AC,804,804,829,820
#4900 829,875,831,8AC,804,804,829,820
#4910 829,875,831,8AC,804,804,829,820
#4920 829,875,831,8AC,804,804,829,820
#4930 829,875,831,8AC,804,804,829,820
#4940 829,875,831,8AC,804,804,829,820
#4950 829,875,831,8AC,804,804,829,820
#4960 829,875,831,8AC,804,804,829,820
#4970 829,875,831,8AC,804,804,829,820
#4980 829,875,831,8AC,804,804,829,820
#4990 829,875,831,8AC,804,804,829,820
#49A0 829,875,831,8AC,804,804,829,820
#49B0 829,875,831,8AC,804,804,829,820
#49C0 829,875,831,8AC,804,804,829,820
#49D0 829,875,831,8AC,804,804,829,820
#49E0 829,875,831,8AC,804,804,829,820
#49F0 829,875,831,8AC,804,804,829,820
#4A00 829,875,831,8AC,804,804,829,820
#4A10 829,875,831,8AC,804,804,829,820
#4A20 829,875,831,8AC,804,804,829,820
#4A30 829,875,831,8AC,804,804,829,820
#4A40 829,875,831,8AC,804,804,829,820
#4A50 829,875,831,8AC,804,804,829,820
#4A60 829,875,831,8AC,804,804,829,820
#4A70 829,875,831,8AC,804,804,829,820
#4A80 829,875,831,8AC,804,804,829,820
#4A90 829,875,831,8AC,804,804,829,820
#4AA0 829,875,831,8AC,804,804,829,820
#4AB0 829,875,831,8AC,804,804,829,820
#4AC0 829,875,831,8AC,804,804,829,820
#4AD0 829,875,831,8AC,804,804,829,820
#4AE0 829,875,831,8AC,804,804,829,820
#4AF0 829,875,831,8AC,804,804,829,820
#4B00 829,875,831,8AC,804,804,829,820
#4B10 829,875,831,8AC,804,804,829,820
#4B20 829,875,831,8AC,804,804,829,820
#4B30 829,875,831,8AC,804,804,829,820
#4B40 829,875,831,8AC,804,804,829,820
#4B50 829,875,831,8AC,804,804,829,820
#4B60 829,875,831,8AC,804,804,829,820
#4B70 829,875,831,8AC,804,804,829,820
#4B80 829,875,831,8AC,804,804,829,820
#4B90 829,875,831,8AC,804,804,829,820
#4BA0 829,875,831,8AC,804,804,829,820
#4BB0 829,875,831,8AC,804,804,829,820
#4BC0 829,875,831,8AC,804,804,829,820
#4BD0 829,875,831,8AC,804,804,829,820
#4BE0 829,875,831,8AC,804,804,829,820
#4BF0 829,875,831,8AC,804,804,829,820
#4C00 829,875,831,8AC,804,804,829,820
#4C10 829,875,831,8AC,804,804,829,820
#4C20 829,875,831,8AC,804,804,829,820
#4C30 829,875,831,8AC,804,804,829,820
#4C40 829,875,831,8AC,804,804,829,820
#4C50 829,875,831,8AC,804,804,829,820
#4C60 829,875,831,8AC,804,804,829,820
#4C70 829,875,831,8AC,804,804,829,820
#4C80 829,875,831,8AC,804,804,829,820
#4C90 829,875,831,8AC,804,804,829,820
#4CA0 829,875,831,8AC,804,804,829,820
#4CB0 829,875,831,8AC,804,804,829,820
#4CC0 829,875,831,8AC,804,804,829,820
#4CD0 829,875,831,8AC,804,804,829,820
#4CE0 829,875,831,8AC,804,804,829,820
#4CF0 829,875,831,8AC,804,804,829,820
#4D00 829,875,831,8AC,804,804,829,820
#4D10 829,875,831,8AC,804,804,829,820
#4D20 829,875,831,8AC,804,804,829,820
#4D30 829,875,831,8AC,804,804,829,820
#4D40 829,875,831,8AC,804,804,829,820
#4D50 829,875,831,8AC,804,804,829,820
#4D60 829,875,831,8AC,804,804,829,820
#4D70 829,875,831,8AC,804,804,829,820
#4D80 829,875,831,8AC,804,804,829,820
#4D90 829,875,831,8AC,804,804,829,820
#4DA0 829,875,831,8AC,804,804,829,820
#4DB0 829,875,831,8AC,804,804,829,820
#4DC0 829,875,831,8AC,804,804,829,820
#4DD0 829,875,831,8AC,804,804,829,820
#4DE0 829,875,831,8AC,804,804,829,820
#4DF0 829,875,831,8AC,804,804,829,820
#4E00 829,875,831,8AC,804,804,829,820
#4E10 829,875,831,8AC,804,804,829,820
#4E20 829,875,831,8AC,804,804,829,820
#4E30 829,875,831,8AC,804,804,829,820
#4E40 829,875,831,8AC,804,804,829,820
#4E50 829,875,831,8AC,804,804,829,820
#4E60 829,875,831,8AC,804,804,829,820
#4E70 829,875,831,8AC,804,804,829,820
#4E80 829,875,831,8AC,804,804,829,820
#4E90 829,875,831,8AC,804,804,829,820
#4EA0 829,875,831,8AC,804,804,829,820
#4EB0 829,875,831,8AC,804,804,829,820
#4EC0 829,875,831,8AC,804,804,829,820
#4ED0 829,875,831,8AC,804,804,829,820
#4EE0 829,875,831,8AC,804,804,829,820
#4EF0 829,875,831,8AC,804,804,829,820
#4F00 829,875,831,8AC,804,804,829,820
#4F10 829,875,831,8AC,804,804,829,820
#4F20 829,875,831,8AC,804,804,829,820
#4F30 829,875,831,8AC,804,804,829,820
#4F40 829,875,831,8AC,804,804,829,820
#4F50 829,875,831,8AC,804,804,829,820
#4F60 829,875,831,8AC,804,804,829,820
#4F70 829,875,831,8AC,804,804,829,820
#4F80 829,875,831,8AC,804,804,829,820
#4F90 829,875,831,8AC,804,804,829,820
#4FA0 829,875,831,8AC,804,804,829,820
#4FB0 829,875,831,8AC,804,804,829,820
#4FC0 829,875,831,8AC,804,804,829,820
#4FD0 829,875,831,8AC,804,804,829,820
#4FE0 829,875,831,8AC,804,804,829,820
#4FF0 829,875,831,8AC,804,804,829,820
```

Program 3.

```
333 DATA"#",0,0,0,63,63,63,63,63,63
334 DATA"#",0,0,0,0,63,63,63,63,63
335 DATA"#",0,0,0,0,0,63,63,63,63
336 DATA"#",0,0,0,0,0,0,63,63,63
337 DATA"#",0,0,0,0,0,0,0,63,63
338 DATA"#",0,0,0,0,0,0,0,0,63
339 DATA"#",0,51,47,3,4,56,32,0
340 DATA"#",0,42,63,54,24,4,0,0,0
350 DATA"#",192,195,247,42,0,0,0,0
360 DATA"#",0,0,63,55,31,1,15,0
361 DATA"#",2,7,63,58,58,26,63,0
362 DATA"#",32,0,57,63,63,61,56,0
363 DATA"#",24,48,22,32,32,32,48,24
364 DATA"#",3,15,31,63,63,15,9,16
365 DATA"#",32,56,60,62,1,16,12,28
366 DATA"#",12,28,63,45,9,9,0,0
367 DATA"#",0,27,47,27,1,62,9,0
368 DATA"#",0,39,59,48,12,35,1,0
369 DATA"#",0,27,47,27,1,62,9,0
370 DATA"#",0,48,63,53,0,32,0,0
371 DATA"#",4,16,4,8,37,0,0,0
372 DATA"#",30,30,12,0,0,0,0,0
373 DATA"#",0,0,0,0,0,0,0,0
374 FORN=47:A=1024:DATA"#",0,0,0,0,0,0,0,0
375 DATA"#",18,36,0,8,42,32,52,7,18,4,9,2,16,3,0,36,16,70
376 DATA"#",0,0,0,0,0,0,0,0
377 FORN=47:A=1024:DATA"#",0,0,0,0,0,0,0,0
378 DATA"#",0,0,0,0,0,0,0,0
379 DATA"#",0,0,0,0,0,0,0,0
380 DATA"#",63,63,63,63,63,31,63,63,63,63,63,15,63,63,63,63,63,63
390 DATA"#",63,63,63,63,63,63,63,63
400 RETURN
500 REM THE MACHINE CODE IS LOCATED
501 REM BETWEEN 4000 AND 4 1100-1256"
502 REM ALL OF IT IS ESSENTIAL
503 REM COPYRIGHT 1984 MARK STEWART
504 POKE0999,96:POKE1400,99:
505 CSAVE"CODE 1",A1099,E1256,AUTO:CSAVE"CODE 2",A4099,E4850,AUTO
506 CSAVE"#4850"
510 GET#1:IF#="E"THENNO
530 GOTO510
```

Swoosh

L W Betteridge,
Colne,
Lancashire.

SWOOSH RUNS on a Vic-20 with a joystick and 3K memory expansion. If more memory is added such as a 16K then the following must be entered first.

POKE641,0:POKE642,4:POKE643,0:
POKE644,30:POKE648,30:SYS64824

The program comes in two parts, the first being the instructions. This part also doubles the screen size to a 30 by 34 display. This program should be entered first otherwise the second part will not run. The second part contains the game which is as follows:

The object is to fly your glider to pick up the bombs from the middle mountain and

(continued on page 189)

ONLY £34·95
(p&p £2·00)

THE ROTRONICS DR2301 COMPUTER/ AUDIO CASSETTE RECORDER

The Rotronics DR2301 has all the facilities you would expect of a quality audio recorder and also works perfectly with the VIC 20 and CBM 64 computers without any fiddly separate boxes or adaptors. Simply connect the DR2301 directly with your Commodore computer via the lead supplied and you are ready to start. The built-in interface circuitry ensures that SAVEing and LOADing is completely reliable – even when using commercially produced software. The DR2301 also allows the computer to sense when the PLAY key has been depressed.

Additional features are auto-stop, tape counter, in-built microphone and foldaway carrying handle. The DR2301 is also compatible with the ZX81, Spectrum and many other popular home computers.

The DR2301 will take its power from the computer (Commodore only), mains adaptor (supplied) or internal batteries. Each unit carries a full 12 month guarantee.

Superb micro accessories from Rotronics

THE ROTRONICS PORTABLE CASE

Here is the ideal portable work station for home, school or work. Specially made for most home micro-computers, it contains your ZX81, Spectrum, VIC20 or CBM64 within a smart executive style case with removable lid for convenience in use.

The individually tailored foam insert securely protects your micro and cassette recorder (C2N or DR2301) during transit. Additional storage space in the lid holds manuals and up to twenty cassettes. A scalpel is provided to modify the insert for expansion units and an alternative insert can be supplied if you change your hardware in the future. The case is also available with uncut foam inserts.

All components remain fully operational within the case via inter-connections routed between the double layers of foam, so there are no unsightly leads.

The case has been designed for easy use with each component positioned for convenient operation. The overall dimensions are 138mm x 725mm x 363mm.

ONLY £34·49 (p+p £2·50)

ORDER FORM

Please send (enter as appropriate)

___ Rotronics Computer/Audio Cassette Recorder(s) at £36.95 each (inc. p+p). _____

___ Rotronics Portable Case at £36.99 each (inc. £2.50 p+p) for ZX81/Spectrum/ VIC 20 with C2N/DR2301*/CBM 64 with C2N/DR2301*/Uncut Foam* _____

Trade Enquiries Welcome
All prices inclusive of VAT TOTAL £ _____

☐ I enclose a cheque/PO* for £ _____ made payable to SMT

☐ Debit my Access/Barclaycard* account no.

(*delete as applicable)

Signature

Name

Address

YC 11/84

Send to (no stamp required):
SMT, FREEPOST, Greens Norton, Towcester, Northants, NN12 8BR

Please allow 28 days for delivery.

VISA

Access

SMT

VIC 20 and CBM 64 are registered trademarks of Commodore Business Machines

EUREK

A 100k BBC-drive for £99 + VAT

We've done it! We've built a mass storage system for your BBC Micro with the power and convenience of a floppy disk drive, but at a fraction the price. Get to know PHLOOPY, the remarkable new 100k drive that costs only £99 plus VAT, and a further £26 plus VAT for the interface to your BBC, operating system and connecting cables.

How PHLOOPY does it

PHLOOPY does not use disks to store data, but a 12-foot loop of professional-quality quarter-inch magnetic tape contained in a robust cartridge. The drive has only one moving part, the motor which drives the tape loop – hence the low price and high reliability. As the loop is driven round, each file of data it contains passes across the magnetic head which reads it or writes to it. Other people have produced tape loop micro-drives, but they've not been very reliable. They lacked PHLOOPY's special secret.

PHLOOPY's special secret

The heart of the invention is a brilliantly designed "byte-wide" magnetic head, made by Phi Magnetronics who build multi-track heads for professional use. PHLOOPY's head records and reads nine tracks across the width of a quarter-inch tape. That means the tape loop can be much shorter, so the typical time to access a file is reduced to a mere 3 seconds. If you're used to waiting for a cassette tape to trundle programs into your BBC, you'll be amazed at PHLOOPY's performance.

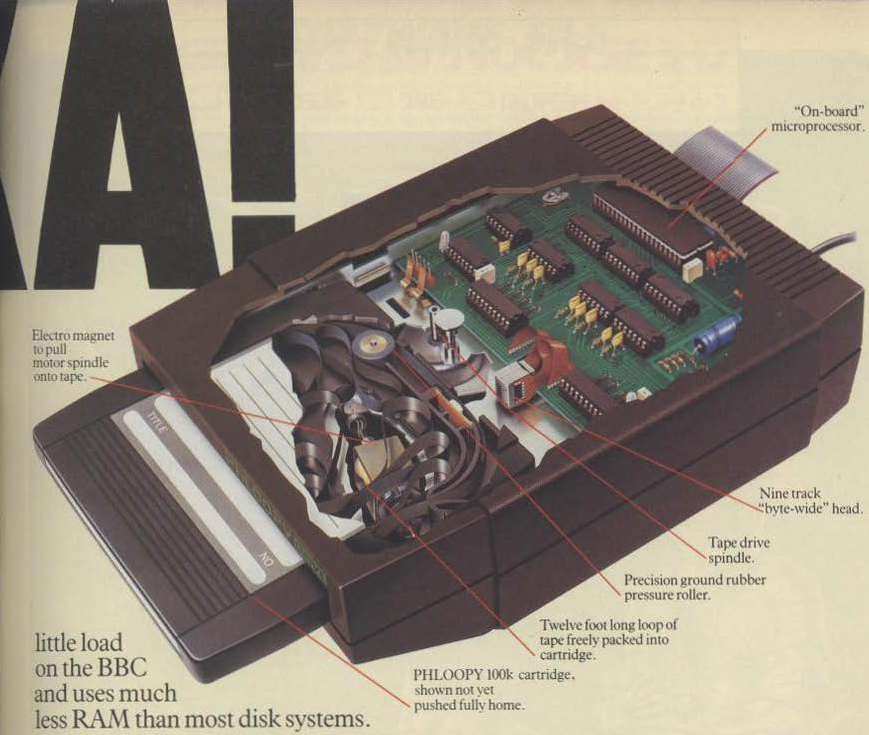
Getting it right every time

In addition, we've included a feature we know you will appreciate. PHLOOPY has full error detection and correction, so you can be certain you will get back what was originally written onto the tape.

Talking to your PHLOOPY

PHLOOPY's own software, contained in ROM, responds to standard BBC filing system and Basic commands. Most programs written to run on disk or cassette should run on PHLOOPY without problem.

And because PHLOOPY contains its own intelligent microprocessor – a second computer which does most of the hard work – PHLOOPY puts very



little load on the BBC and uses much less RAM than most disk systems.

Installing PHLOOPY on your BBC

You'll be amazed how simple it is to install PHLOOPY. Just plug in the interface cut two resistors (clearly marked in the instructions) and the job is done. If you should have problems our engineers are waiting to help you.

Making a PHLOOPY Library

PHLOOPY cartridges hold a full 100k of data or programs. Two of them come free with the drive and extra ones cost £3.75 each plus VAT. They are moulded of high impact polymers for protection and store easily on a bookshelf. Many programs will be available to purchase on PHLOOPY.

Phi Mag Systems Ltd.
PO Box 21, Falmouth,
Cornwall TR11 3TD.
Telephone: (0326) 76040.

Order Form

- Please send me further details about the PHLOOPY 100k data storage system for the BBC Model B.
- Please send me _____ (qty) PHLOOPY starter pack(s) for my BBC Model B microcomputer, including PHLOOPY drive, BBC interface, leads, connections, operating system in firmware, manual, and two PHLOOPY 100k cartridges, at £147.75 each including VAT, postage and packing. Amount £_____
- Please send me _____ (qty) packs of 5 PHLOOPY cartridges at £19.75 including VAT, postage and packing. Amount £_____

I enclose a cheque/PO for £_____ OR Please debit my Access card: Number: _____

Your order will be acknowledged within 10 days, giving a delivery date.

Name_____

Address_____

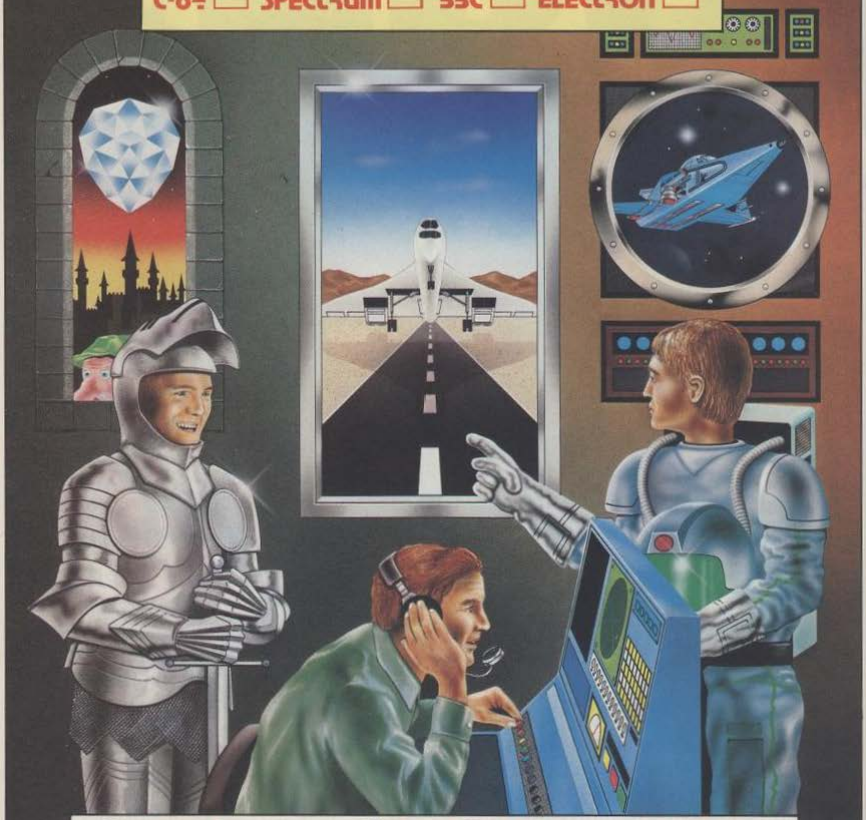
Town: _____ Post code_____

Send this coupon to:
Phi Mag Systems Ltd, PO Box 21, Falmouth,
Cornwall TR11 3TD. Telephone: Falmouth (0326) 76040.
14 day money-back option.

YC

THE BEST SOFTWARE IN AGES

C-64 ☐ SPECTRUM ☐ BBC ☐ ELECTRON ☐



FANTASIA DIAMOND

Delve deep into the age of fantasy with a host of intriguing characters that may help or hinder your exploration of this dream world.

Retrieve the magnificent Fantasia Diamond recently stolen and rescue Boris the master spy from the imposing fortress and its evil guardian. Talk to the Robot, Violinist and other characters to illicit their help.

An enthralling and sophisticated graphic adventure by Kim Topley for the Spectrum 48K, Commodore 64, BBC Model B* and Acorn Electron*.

SRP £7.95

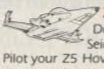
*No graphics on these versions.

HEATHROW ATC

Your challenge in the age of technology is to direct the incoming aircraft at the world's busiest international airport, Heathrow. Monitor the stack displays of altitude, heading, velocity and aircraft type. Scan the radar for blips and trails. Develop your skills to tackle emergencies, rogue aircraft, radio and instrument failure.

A highly acclaimed simulation of one of today's most demanding jobs, by Mike Male for any Spectrum, Commodore 64, BBC Model B and Acorn Electron.

SRP £7.95



3D LUNATTACK

Do battle with the Seiddab in a futuristic age. Pilot your Z5 Hoverfighter over the craters and around the mountains of the luna landscape. Equipped with the latest iridium lazers, duodec missiles, radar, navigation and shields penetrate the Seiddab defences and head towards their command base. Destroy the Seiddab Dab Tanks, Aerial Mines, missile silos and Hoverfighters, you must not fail in your mission to drive the Seiddab from their luna base. A stunning 3D Graphic Presentation by Steve Turner for the Spectrum 48K and Commodore 64.

SRP £7.95

GSH

HEWSON CONSULTANTS

56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX

As part of our continuing development of innovative software, we are always happy to evaluate software sent to us with a view to publication.

Selected items available from Centresoft Dealers and all leading computer software retailers

WHSMITH Rumbelows John Menzies TIGER TRADER spectrum LASKYS HMV

(continued from page 184)

to drop them into the volcano on the right. You have three men which can be lost by hitting the scenery, running out of time on each bombing run, being hit by either the bird or helicopter or by being struck by lightning. To make it more difficult, with each run, the scenery gets slightly more difficult.

Also the controls of the glider are difficult to master. Left or right is obtained by moving the joystick in the appropriate direction, but to go up or down you have to hit a thermal and they may not be where you want them. You get 100 points for each bomb that lands on target which is done by pressing the fire button. When all your men have been lost press the space bar to continue. The screen displays lives, score and time for each run.

If the task of typing in the program is too daunting it can be obtained from me for £4 at 3 Greenfield House, Greenfield Road, Colne.

Program 1.

```
1 POKE788,194:POKE37150,2:REM***(C) 1983***
2 REM***TITAN  S.WARE*
3 REM***BY L.W.BETTERIDGE***
4 PRINT"♥":POKE36879,127:PRINT"■■■■■■■■DON'T TOUCH TAPE."
5 POKE36878,15:POKE36875,191:FORI=1TO50:NEXT:POKE36875,0
6 FORI=1TO3000:NEXT
7 POKE36879,25:PRINT"♥■■■■■"
8 POKE36878,15
9 PRINT"■   ┌─┐
10 PRINT"   │ │
11 PRINT"   │ │
12 PRINT"   ├─┐
13 PRINT"   │ │
14 PRINT"   ├─┤      ■SWOOSH(C)■ :  ||
15 PRINT"■]  └──┘ ■   ────────■
16 PRINT"   ┌─
17 PRINT"   │
18 PRINT"   └──SOFTWARE
19 POKE36875,0
20 DATA215,1,220,.5,225,1,225,1.5,215,.5,220,1.5,225,.5,220,1.5,225,.5,209,5.5,2
15,1
21 DATA223,.5,219,1,219,1,223,1,221,.5,219,.5,215,1,215,1,219,1,217,.5,215,1,209
,.5
22 DATA225,1,225,1,225,2,195,1,207,1,215,.5,195,1,5,201,.5,203,1,5,215,.5,195,1,
5
23 DATA201,.5,207,4,4.5,-1,-1
24 READAA:READBB:IFAA=-1THEN26
25 POKE36875,AA:FORI=1TO250*BB:NEXT:POKE36875,0:GOTO24
26 POKE36869,242:PRINT"♥■■■■  ∖/■|-/-|∖|/■":PRINT"■■■  ──────────
27 PRINT"■HE OBJECT IS TO PICK UP BOMBS FROM THE    MOUNTAIN TOP AND TO   DROP
THEM
28 PRINT"■■■■■INTO THE VOLCANO.
29 PRINT"UNFORTUNATELY YOU ONLYHAVE 35 SECONDS TO    DROP EACH BOMB.
30 PRINT"■O GAIN OR LOSE HEIGHTUSE THE THERMALS FROM THE  SCENERY  BELOW.
31 PRINT"■O ALTER DIRECTION USEJOYSTICK,TO DROP BOMBSUSE FIRE BUTTON.
32 PRINT"■■■■■■L"■■ ■/|/"|
33 GETA$:IFA$=""THEN33
34 PRINT"■■■■■L"■■" ■■|    ":FORI=1TO1000:NEXT
35 DATA192,240,252,255,255,255,255,255
36 DATA0,0,0,0,192,240,252,255
37 DATA48,32,63,56,56,60,4,6
38 DATA32,32,224,32,32,32,40,56
39 DATA0,0,0,0,3,15,63,255
40 DATA3,15,63,255,255,255,255,255
41 DATA4,4,7,4,4,4,20,20
42 DATA12,4,252,28,20,60,32,96
43 DATA1,3,7,15,31,63,127,255
44 DATA128,192,224,240,248,252,254,255
45 DATA4,5,7,1,1,3,2,2
46 DATA32,160,224,128,128,224,64,64
47 DATA106,90,86,86,86,117,117,254
48 DATA165,165,85,85,149,149,181,189
49 DATA0,0,0,0,0,15,63,255
50 DATA0,0,0,0,0,240,252,255
51 DATA1,7,127,255,63,15,3,1
52 DATA128,224,254,255,252,240,192,128
53 DATA3,15,7,15,63,127,63,7
54 DATA192,240,224,240,252,254,252,224
55 DATA4,0,16,32,120,16,32,124
56 DATA56,207,207,56,56,24,15,14
57 DATA0,0,32,127,0,0,0,0
58 DATA3,15,47,127,0,0,0,0
59 DATA0,0,219,146,210,82,219,0
60 DATA0,0,187,170,187,170,171,0
61 DATA238,170,167,234,234,170,247,247
62 DATA60,102,90,90,126,129,255,129
63 DATA255,255,51,51,255,51,51,255
64 DATA42,62,28,28,28,28,28,0
65 DATA0,0,117,37,37,37,37,0
66 DATA0,0,87,244,183,20,23,0
67 DATA0,0,0,0,0,0,0,0
68 DATA255,255,255,255,255,255,255,255
69 DATA0,0,0,0,24,0,0,0
70 DATA56,56,56,56,56,56,56,56
71 DATA1,3,11,15,63,127,127,255
72 DATA128,128,196,240,252,252,254,255
73 DATA1,3,7,15,31,63,127,255
74 DATA128,192,224,240,248,252,254,255
75 DATA252,149,150,170,170,170,170,170
76 DATA191,175,251,251,250,238,238,239
77 DATA254,250,251,251,251,238,238,239
78 DATA84,16,16,137,162,160,32,0
79 DATA128,136,132,129,133,140,144,106
80 DATA0,0,171,250,219,138,139,0
81 DATA0,0,162,50,170,38,162,0
82 DATA0,0,0,0,0,0,0,0
83 DATA62,67,69,73,83,99,62,0
84 DATA4,4,4,4,12,12,12,0
85 DATA126,1,1,6,24,96,127,0
86 DATA126,2,2,30,3,3,127,0
87 DATA32,36,100,127,4,4,4,0
88 DATA63,32,32,30,1,33,30,0
89 DATA63,32,32,63,97,97,127,0
90 DATA126,2,2,2,3,3,3,0
91 DATA126,66,66,126,67,67,127,0
92 DATA126,66,126,3,3,3,0,-1
93 POKE36879,8
94 POKE36865,21
95 POKE36864,6
96 POKE36866,30
97 POKE36867,66
98 PRINT"♥":FORI=7168TO8186:POKEI,32:NEXT
99 FORI=6144TO6655:POKEI,PEEK(I+26624):NEXT:I=6144
100 READA:IFA=-1THEN103
101 POKEI,A:I=I+1:GOTO100
102 POKE36878,PEEK(36878)AND15OR(80)
103 POKE36869,254
104 POKE56,24:POKE52,24
105 POKE36866,PEEK(36866)ANDNOT128
106 POKE36869,242
107 DATA120,169,0,141,20,3,169,***,141,21,3,88,96,169,0,141,19,145,141,34,145,17
3,17,145
108 DATA41,31,74,74,133,144,173,17,145,41,32,74,5,144,133,144
109 DATA173,32,145,41,128,74,74,74,74,5,144,73,31,133,144,169,255,141,34,145,76,
191,234
110 DATA234
111 S=673:FORI=0TO63:READA$
112 IFA$="***"THENPOKES+I,(S+13)/256:POKES+I-5,(S+13)AND255:NEXT
113 POKEI+S,VAL(A$):NEXT
114 POKE36878,15:POKE36875,191:FORI=1TO50:NEXT:POKE36875,0:POKE36879,104
115 PRINT"♥■■■■■■          LOADING (MB)":PRINT"♥":FORI=1TO3000:NEXT
116 POKE198,3:POKE632,147:POKE633,131
```

Program 2.

```
1 LI=3:POKE36879,232:T=7790:P=1:POKE36878,9:ZZ=7678:GOTO62
2 T=T-1:IFPEEK(T)<>32THENPOKEY+1,32:POKEY+30,32:POKET,32:GOTO90
3 POKEQ,32:POKET,5:P=P+1:IFT=7768THENT=7790:POKET-30,32
4 S=22:Q=T:POKET+C,15:IFP=-1THENS=23
5 RETURN
6 POKEO1,32:ZZ=ZZ-1:IFPEEK(ZZ)<>32THENPOKEY+1,32:POKEZZ,32:GOTO90
7 POKEZZ,43:IFZZ=7648THENZZ=7678:POKEZZ-30,32
8 O1=ZZ:POKEZZ+C,10:RETURN
9 H=V:V=V-30:POKEH+61,32:POKEH+30,32:POKEH+31,32:IF(PEEK(V)ORPEEK(V+1))<>32THEN9
0
10 IFTI$>"000035"THEN90
11 IFR=1AND(RND(9)>.9THENGOTO110
12 R=0:POKE36877,INT(V/33):IFU=1THENPOKEH+60,32:POKEH+61,32:POKEH+30,32:POKEH+31
,32
13 POKEV+31+C,6:POKEV+1+C,2
14 POKEV,O1:POKEV+C,2:POKEV+1,O2:POKEV+30,M:POKEV+30+C,N:POKEV+31,K:POKEV+31+C,L
15 IFU=1ANDO=1THENPOKEV+61,29
16 POKE36877,INT(V/33):IFU=1ANDO=-1THENPOKEV+60,29
17 IFSTICKAND8THENM=2:N=1:K=3:L=0:O1=0:O2=1:O=1:POKEY,32:POKEY+1,32:GOTO61
18 IFSTICKAND4THENM=6:N=0:K=7:L=1:O1=4:O2=5:O=-1:POKEY,32:POKEY+1,32:GOTO61
19 IFU=0ORG<>1THEN21
20 IFSTICKAND16THENJ=H+31:GOTO102
21 GOSUB2:GOSUB6:GOTO9
22 H=V:V=V+30:IFU=0AND(PEEK(V+30)ORPEEK(V+31))<>32THENPOKEY-30,32:POKEY-29,32:GO
TO90
23 IFU=1AND(PEEK(V+60)ORPEEK(V+61))<>32THENPOKEY-30,32:POKEY-29,32:GOTO90
24 POKEH+30+C,6:POKEV+31+C,6:POKEV,32:POKEV+1,32:POKEV+C,2:IFTI$="000035"THEN90
25 POKEV,O1:POKEV+30+C,N:POKEV+30,M:POKEV+31+C,L:POKEV+31,K
26 POKE36877,INT(V/33):POKEV+1+C,2:POKEV+1,O2:BB=0
27 IFU=1ANDO=1THENPOKEV+61,29:POKEV+C+61,0
28 IFU=1ANDO=-1THENPOKEV+60,29:POKEV+60+C,0
29 IFSTICKAND8THENM=2:N=1:K=3:L=0:O1=0:O2=1:O=1:POKEI-/,32:POKEY,32:POKEY+30,32
:BB=1
30 IFSTICKAND4THENM=6:N=0:K=7:L=1:O1=4:O2=5:O=-1:POKEY+1,32:POKEY,32:POKEY+31,32
:BB=1
31 IFBB=1ANDU=1THENPOKEV+60,32:POKEV+61,32:GOTO61
32 IFBB=1THENGOTO61
33 POKEV-30,32:POKEV-29,32:POKEV,32:POKEV+1,32:GOSUB2:GOTO22
34 LI=3:POKE7864,32:POKE7834,32:POKE7774,32:POKE7503,32:POKE7502,32:POKE7474,32
35 POKE7473,32:PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■!!!!!!!!":ZZ=7678
36 POKEV,32:POKEV+1,32:POKE36878,9
37 V=7700:C=30720:M=2:N=1:K=3:L=0:B=7641:O=1:O2=1:O1=0:U=0:TI$="000000":R=0
38 POKEB,29:POKEB+C,0:T=7790:P=1
39 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■RIGHT$(TI$,4):PRINT"■■■■■LI:PRINT"■■■■■■■■■■"S
C
40 POKEH,32:POKEH+30,32:POKEH+1,32:POKEH+31,32:IFTI$>="000035"THEN90
41 IFO=1ANDU=1AND(PEEK(V+61))<>32THEN90
42 IFO=-1AND(PEEK(V)ORPEEK(V+30))<>32THEN90
43 IFO=-1ANDU=1AND(PEEK(V+59))<>32THEN90
44 IFO=1AND(PEEK(V+61)=29)THENU=1
45 IFO=-1AND(PEEK(V+60)=29)THENU=1
46 IFO=1AND(PEEK(V+1)ORPEEK(V+31))<>32THEN90
47 IFU=1ANDO=-1THENPOKEH+60,32
48 IFU=1ANDO=1THENPOKEH+61,32
49 POKEV,O1:POKEV+C,2:POKEV+1,O2:POKEV+1+C,2:POKEV+30,M
50 POKEV+30+C,N:POKEV+31,K:POKEV+31+C,L:IFU=1ANDO=-1THENPOKEV+60,29:POKEV+60+C,0
51 H=V:GOSUB73:IFU=1ANDO=1THENPOKEV+61,29:POKEV+61+C,0
52 IFSTICKAND4THENM=6:N=0:K=7:L=1:O1=4:O2=5:O=-1:IFU=1THENPOKEV+61,32
53 IFSTICKAND8THENM=2:N=1:K=3:L=0:O1=0:O2=1:O=1:IFU=1THENPOKEV+60,32
54 IF((V-7174)/30)=INT((V-7174)/30)THEN9
55 GOSUB2
56 IF((V-7170)/30)=INT((V-7170)/30)THEN9
57 IF((V-7186)/30)=INT((V-7186)/30)ANDV>7400THENR=1:GOTO9
58 IF((V-7190)/30)=INT((V-7190)/30)THEN9
59 IF((V-7193)/30)=INT((V-7193)/30)THENPO=1:GOTO9
60 IF((V-7177)/30)=INT((V-7177)/30)THEN22
61 V=V+5:GOTO39
62 PRINT"♥":POKE36869,254:B=30720:DATA7213,10,1,7253,16,1,7291,17,1
63 I=7168:FORT=1TOI+26:POKET,33:POKET+B,1:NEXT:I=7198:FORT=I+15TOI+26:POKET,33
64 POKET+B,1:NEXT:I=7228:FORT=I+25TOI+29:POKET,33:POKET+B,1:NEXT
65 DATA7290,16,1,7325,19,1,7354,19,1,7420,16,0,7427,17,0:I=7290
66 I=7319:FORT=1TOI+6:POKET,33:POKET+B,1:NEXT:I=7350:DATA7319,18,1,7350,16,1
67 FORT=1TOI+4:POKET,33:POKET+B,1:NEXT:I=7400:FORT=I+13TOI+18:POKET,33:POKET+B,0
:NEXT
68 DATA7450,16,0,7456,19,0,7481,18,0,7485,19,0,7488,20,7:I=7451
69 FORT=1TOI+5:POKET,33:POKET+B,0:NEXT:I=7482:FORT=1TOI+3:POKET,33:POKET+B,0:NEX
T
70 DATA7510,20,7,7512,34,1,7515,20,7,7532,16,1,7540,20,7,7721,34,1
71 DATA7533,33,1,7534,17,1,7562,18,1,7564,17,1,7571,34,1,7567,33,1,7721,34,1
72 DATA7838,21,0,7850,21,0,7854,21,0,7884,21,0,7894,21,0,7871,27,2,7876,21,0,789
3,21,1
73 DATA7894,35,2,7906,35,2,7890,35,2,8079,45,1,8079,46,1,7910,35,2,7913,12,10,79
14,13
74 DATA10,7896,36,0,7903,37,0,7912,36,0,7915,37,0:I=7897:FORT=1TOI+5:POKET,33:PO
KET+B,0
75 NEXT:DATA7920,35,0,7921,39,0,7922,33,0,7923,39,0,7925,36,5,7934,37,5
76 I=7916:FORT=I+8TOI+15:POKET,33:POKET+B,5:NEXT
77 DATA7936,35,0,7937,38,0,7939,39,0,7940,35,0,7941,36,0,7938,33,0,7942,33,0
78 FORT=I+24TOI+29:POKET,33:POKET+B,5:NEXT
79 DATA7948,37,5,7950,33,0,7951,28,0,7952,28,0,7953,28,0,7954,33,0,7956,33,5,796
6,33,0
80 I=7948:FORT=I+9TOI+231:POKET,33:POKET+B,5:NEXT
81 DATA7967,28,2,7968,28,2,7969,28,2,7970,33,0,7966,33,0,7965,37,5,7943,42,10,79
44,41
82 DATA10,7932,40,13,7928,40,13,7929,40,13,7972,40,13
83 POKEI-3+B,0:POKEI-2+B,0:POKEI-1+B,0
84 DATA7996,33,0,8000,33,0,7997,28,2,7998,28,2,7999,28,2,7957,17,5
85 DATA7955,33,0,7924,35,0,8015,19,5,8022,18,5,8069,30,1,8070,31,1,8057,24,1,808
4,25,1
86 I=8009:FORT=I+8TOI+13:POKET,32:POKE(T-28),32:NEXT
87 DATA7994,18,5,-1,-1,-1
88 READA:READB:READC:IFA=-1THEN37
89 POKEA,B:POKEA+B,C:GOTO88
90 POKE36877,0:FORM=1TO40:NEXT
91 POKE36878,15:POKE36877,220:FORL=15TO0STEP-1:POKE36878,L
92 GOSUB98
93 IFU=1THENPOKEH+60,32:POKEH+61,32
94 IFPEEK(H-30)=40ORPEEK(H-30)=4THENPOKEH-30,32
95 IFPEEK(H-29)=40ORPEEK(H-29)=4THENPOKEH-29,32
96 POKEH,82:POKEH+C,10:POKEH+1,73:POKEH+1+C,9:POKEH+30,83:POKEH+30+C,10:POKEH+31
,56
97 POKEH+31+C,10:NEXTL
98 POKEH,32:POKEH+1,32:POKEH+30,32:POKEH+31,32
99 POKEO,32:IFL>0THENRETURN
100 POKE36879,9:LI=LI-1:IFLI=0THENSC=0:POKEZZ,32:WAIT197,32:RUN34
101 GOTO37
102 FORED=230TO128STEP-1:POKE36876,ED:POKEJ,32:J=J+30:IFPEEK(J)<>32THEN104
103 POKEJ,29:FORT=1TO10:NEXTT:NEXTED
104 FORED=15TO0STEP-1:POKE36879,ED+15:FORI=1TO10:NEXTI:POKE36876,ED:POKE36877,20
0:NEXTED
105 POKE36876,0:U=0:IFFR=1THENSC=SC+100:FO=0:POKE7864,21:POKE7864+C,1
106 IFSC>600THENPOKE7834,21:POKE7834+C,0
107 IFSC>900THENPOKE7503,17:POKE7503+C,1:POKE7502,16:POKE7502+C,1
108 IFSC>1200THENPOKE7474,17:POKE7474+C,1:POKE7473,16:POKE7473+C,1
109 POKE36879,232:GOTO36
110 FORR=7496TO7446STEP20:POKER,20:POKER+C,2:POKE36876,241:POKE36876,0
111 NEXTR:FORR=7446TO7496STEP-20:POKER,32:NEXTR:GOTO90
```

SOFTWARE FILE

Roulette

A P Brooks,
Warrington,
Cheshire.

AMSTRAD

THIS GAME is a version of the casino game Roulette for the Amstrad CPC-464. Full instructions and a list of all the main key terms are listed in the program.

The program makes good use of locomotive Basic and also includes the tune *The Entertainer.*

```
10 MODE 0:BORDER INT(RND(1)*27),INT(RND(1)*27):FOR A=2
TO 26:ON INT(RND(1)*25)+1,INT(RND(1)*27):NEXT:ON
0.0:INK 1,26:PEN 1:PRINT
" ROULETTE":PRINTPRINT
20 FOR a=2 TO 15 STEP 2:PEN a:PRINT"ROULETTE":PEN a+1:
PRINT"                    ROULETTE":NEXT
30 READ A:IF A=-1 THEN 50
40 SOUND 1,A,23,15:GOTO 30
50 PEN 1:LOCATE 1,21:PRINT"          DO YOU WANT  INSTRU
CTIONS (Y/N)"
60 a$=UPPER$(INKEY$):IF a$<>"Y" AND a$<>"N" THEN 60
70 IF a$="N" THEN 100 ELSE 1900
80 DATA 239,201,190,1,19,0,190,119,190,119,119,119,119,
0,119,106,100,95,119,106,95,0,127,106,0,119,119,119,11
9,119,213,201,190,119,0,
119,0,190,119,119,119,119,119,0,142,189,189,142,119,95
,0,106,119,189,106,106,106,106,0,0,213,201
90 DATA 190,119,0,190,119,0,190,119,119,119,119,0,119,
106,100,95,119,106,95,0,127,106,0,119,119,119,119,119,
0,119,106,95,119,106,95,
0,119,0,190,119,95,119,106,95,0,119,106,119,95,119,106,9
5,0,127,106,0,119,119,119,119,-1
100 INK 0,26:BORDER 19:INK 1,0:INK 2,3:INK 3,12:MODE 1
110 DIM s(36,6),n(12):mo=500:r=360/37:bo=5000
120 SYMBOL AFTER 200:SYMBOL 200,126,198,206,214,230,19
8,126,0:SYMBOL 201,0,4,4,4,4,4,4,0:SYMBOL 202,255,251,
248,253,251,247,241,255
SYMBOL 203,0,1,1,1,1,1,1,0:SYMBOL 204,255,253,249,245,
240,253,253,255
130 SYMBOL 205,0,14,8,14,1,1,14,0:SYMBOL 206,255,249,2
47,241,246,246,249,255:SYMBOL 207,0,14,2,4,8,8,8,0:SYM
BOL 208,255,249,246,246,
249,246,246,249:SYMBOL 209,0,6,9,9,7,1,6
140 SYMBOL 210,255,206,214,214,214,214,208,255:SYMBOL
211,255,221,221,221,221,221,221,255:SYMBOL 216,0,36,42
,34,36,40,46,0:SYMBOL 21
0,0,34,20,8,20,34,0,47,34,34,0
150 SYMBOL 217,255,217,222,222,217,222,222,217:SYMBOL
219,255,209,215,209,222,222,209,255:SYMBOL 220,0,38,40
,46,41,41,41,0:SYMBOL 221
,255,209,221,219,215,215,215,255
160 SYMBOL 222,0,38,41,41,38,41,41,38:SYMBOL 223,0,38,
41,41,39,33,38,0:SYMBOL 224,255,176,86,214,182,118,16,
255:SYMBOL 226,255,187,8
5,213,187,17,255
170 SYMBOL 228,255,189,89,213,176,125,29,255:SYMBOL 23
0,255,185,87,209,182,118,25,255:SYMBOL 225,0,68,164,36
,68,132,220,0:SYMBOL 227
,0,70,161,33,70,129,225,6:SYMBOL 229,0,78,168,46,65,12
9,238,0
180 SYMBOL 232,0,78,162,36,72,136,232,0:SYMBOL 233,255
,185,86,214,182,118,22,255:SYMBOL 234,255,185,86,214,1
84,126,25,255:SYMBOL 235
,0,207,41,41,201,41,47,192:SYMBOL 237,0,196,42,34,196,
40,46,197
190 SYMBOL 239,0,194,38,42,207,34,34,192:SYMBOL 241,0,
198,40,46,201,41,38,197
200 SYMBOL 236,255,59,219,219,59,219,219,63:SYMBOL 238
,255,87,222,217,87,222,217,87:SYMBOL 240,255,47,215,20
8,62,222,209,63
210 DES=s=0:FOR a=1 TO 36:STEP a:ink 2,a*490+121+SIN(a
/rad(3)*2*pi)*121:COS(a)=b=b+1:NEXT
220 FOR a=0 TO 36:READ a(a),a(a),a(a),a(a):NEXT
230 DATA 1,0,200,3,32,201,2,15,202,33,19,203,2,4,204,3,
31,205,2,2,206,3,25,207,2,17,208,3,34,209,2,6,210,2,27
,211,3,21,212,3,36,213,2
,11,214,3,30,219,3,20,220,2,25,221,3,10,222,3,5,223,2,
4,224,3,16,225,2,33,226,3,1,227,2,20,228
240 DATA 3,29,229,2,31,230,3,7,231,2,23,232,3,18,234,3
,29,235,2,7,236,3,38,237,2,12,238,3,35,239,3,2,240,3,2
6,241
250 FOR a=0 TO 36:READ a(a),s1(a),a(a)NEXT
260 DATA 1,4,2,3,2,4,2,5,3,3,3,8,3,5,4,3,4,4,4,5,5,3,5
,6,5,2,6,1,7,6,7,7,4,7,7,5,8,3,8,4,8,5,9,3,9,4,9,5
,10,5,10,4,10,5,11,3,11,
4,11,5,12,3,12,4,12,5,13,3,13,4,13,5
270 FOR a=0 TO 400 STEP 2:PLOT 0,a,1:DRAW 640,a:NEXT:r
INK 0:PEN 0:GOSUB 1000
280 WINDOW #1,1,8,1,14:WINDOW #2,10,20,3,3:WINDOW #3,2
,22,16,25:WINDOW #4,10,22,5,25:PEN 2:LOCATE 23,20:PRIN
T"WITTIN & DESBIONES!!!"
N 3:LOCATE 30,22:PRINT"BY..":PEN 0:LOCATE 27,24:PRINT
The Wizard":WINDOW #5,15,16,14,14
290 CLS #1:CLS #2:CLS #3:CLS #4:CLS #5
300 PRINT:CHR$(22)+CHR$(0)+CHR$(DES)+CHR$(0)FOR a=1 TO 36:
STEP 2:PLOT 498,252,0:DRAW 490+(2*s1(a)*COS(a)),260+(2*s1(a)
*SIN(a)):NEXT:PLOT 0,0,
0:MOVE 490+(2*s1(a)*COS(a)),260+(2*s1(a)*SIN(a)):FOR a=1
TO 36:s(a)=b+1:NEXT:GOTO
310 PLOT 0,0,0:MOVE 360,115:DRAW 360,400:LOCATE 1,1
:PEN 1:PRINT CHR$(24)+"ROULETTE"+CHR$(24?):PLOT 318
,370,1:DRAW 318,400:CLS
#3:CLS #4:PRINT#4,"  "CHR$(19)+"PRESS"+CHR$(19)+"FOR
INT#4:PRINT#4,"A-Z To Gamble"
320 PRINT#4,"Q to Quit":PRINT#4:PRINT#4,"L to Borrow":
PLOT 0,0,1:DRAW 600,0:GOTO 490
330 CLS #1:PRINT CHR$(22)+CHR$(0):PEN 1:LOCATE 1,2:PRI
NT" H  L":PRINT" I  O":PRINT" G  W":PRINT" M":PRINT
" D  E":PRINT" O  V":P
RINT" D  E":PRINT"  N ":PRINT:PEN 2:PRINT CHR$(24
)+CHR$(215):PEN 3:PRINT"  CHR$(24)+CHR$(215):
340 PRINT:PEN 2:PRINT CHR$(23)+CHR$(212):PEN 3:PRINT
"CHR$(23)+CHR$(212):PEN 1:PRINT:PRINT"  123DEF"
350 FOR a=0 TO 36:PEN a+1,0:LOCATE a(a,4),a(a,5):PRIN
T CHR$(a,a):NEXT:MOVE 0,0,1:DRAW 0,398:DRAW 135,398
:PLOT 0,320:DRAW 135,320
:PLOT 0,384:DRAW 135,384:PLOT 0,256:DRAW 135,256:PLOT
0,192:DRAW 185,192:PLOT 31,400:DRAW 31,170:PLOT 80,170
:DRAW 80,400
360 RETURN
370 GOSUB 330:CLS #5
380 a=INT(RND(1)*36)+3:b=INT(RND(1)*30)+7
390 TAG:PLOT -10,-10,1:MOVE a(v,2),a(v,3):PRINT CHR$(2
31)
400 IF x<>1 THEN TAGOFF:GOSUB 1870
410 FOR t=1 TO 111-(v*3):NEXT
420 PLOT -10,-10,a(v,1),0:MOVE a(v,2),a(v,3):PRINT
CHR$(a(v,1),0)1
430 IF x<>1 THEN TAGOFF:RETURN
440 v=v+rnd:v=v-1:SOUND 1,87,5,15
450 IF v>36 THEN v=v-36
460 IF v<36 THEN v=v+36
470 IF v>36 THEN v=v-36
480 GOTO 390
490 CLS #3:PEN #3,1:PRINT#3,"A en plien  B a
cheval  C transversale oleine0 en carre
E transversal six
F a column  G a dozen  H high or
low  I red or yellow  J odd or even"
500 PLOT 0,0,1:DRAW 400,0:IF mo>bo=2 THEN mo=mo-bo:bor
=bor+bo:mo=0
510 PRINT#2,"e":RIGHT$(STR$(mo),LEN(STR$(mo))-1):GOSUB
530
520 a$=UPPER$(INKEY$):IF a$="" THEN 520
530 a=ASC(a$)-64:IF a<1 THEN 520
540 ON a GOTO 590,700,850,970,1100,1220,1340,1470,1600
,1730
550 IF a$="Q" THEN INK 0,0:INK 1,26:PEN 1:MODE 1:BORDE
R INT(RND(1)*26):END
560 IF a$="L" THEN 2130
570 IF mo<500000000 THEN 2160
580 GOTO 520
590 PEN #3:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
an plien"
600 PEN #3:PRINT#3,"You can only bet on  one number.
"
610 INPUT#3,"How much do you bet:"m
620 IF m=mo OR m<0 THEN GOSUB 1860:GOTO 590
630 INPUT#3,"Number do you wish to bet on:"n
640 IF n>36 OR n<0 OR n<>INT(n) THEN GOSUB 1860:GOTO 5
90
650 CLS #3:PLOT 0,0:DRAW 400,0:PEN #3,2:PRINT#3,"
an plien"
660 PEN #3,1:PRINT#3:PRINT#3,"  You have bet"n"on"n
670 PEN 1:LOCATE a(n,4),a(n,5):PRINT CHR$(144):GOSUB 3
80
680 IF rnd(v,1) THEN mo=mo+(35*m) ELSE mo=mo-m
690 GOTO 490
700 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
a cheval"
710 PEN #3,1:PRINT#3,"You can only bet on two numbers
either  horizontally or  vertically"
720 INPUT#3,"How much do you bet:"m
730 IF m=mo OR m<0 THEN GOSUB 1860:GOTO 700
740 INPUT#3,"Which numbers do you wish to bet on:n
750 IF n<0 OR n>36 OR n<36 OR n>36 THEN GOSUB 1860:GOTO
700
760 IF (n=0 AND (n=2 OR n=3)) OR (n=0 AND(n=2 OR n=3))
THEN GOO
770 FOR a=1 TO 37 STEP 3:IF (n=a AND n=a+1) OR (n=a AN
D n=a+3) OR (n=a+3 AND n=a+2) OR (n=a+1 AND n=a+2) THE
N GOO ELSE NEXT
780 IF n=n-3 OR n=n+3 THEN GOO ELSE GOSUB 1860:GOTO 70
0
790 GOSUB 1860:GOTO GOTO 700
800 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
a cheval"
810 PEN #3,1:PRINT#3,"You have bet"n"on"n"&"n
820 PEN 1:LOCATE a(n,4),a(n,5):PRINT CHR$(144):LOCATE
a(n,4),a(n,5):PRINT CHR$(144):GOSUB 380
830 IF rnd(v,1) OR rnd(v,1) THEN mo=mo+(17*m) ELSE mo=
mo-m
840 GOTO 490
850 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3," tran
sversal oleine"
860 PEN #3,1:PRINT#3,"You can bet on any  row of numb
ers"
870 INPUT#3,"How much do you bet:"m
880 IF m<mo OR m<0 THEN GOSUB 1860:GOTO 850
890 INPUT#3,"Input the left-most number:"n
900 IF n<1 OR n>34 THEN GOSUB 1860:GOTO 850
910 FOR a=1 TO 34 STEP 3:IF a=n THEN 920 ELSE NEXT:GOS
UB 1860:GOTO 850
920 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3," tran
sversal oleine"
930 PEN #3,1:PRINT#3:PRINT#3,"  You have bet"n"on"n+1
n+2
940 PEN 1:LOCATE a(n,4),a(n,5):PRINT CHR$(144):LOCATE
a(n+1,4),a(n+1,5):PRINT CHR$(144):LOCATE a(n+2,4),a(n+
2,5):PRINT CHR$(144):GOS
UB 380
950 IF rnd(v,1) OR rnd(v,1) OR rnd(v,1) THEN mo=mo+(11
*m) ELSE mo=mo-m
960 GOTO 490
970 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
en carre"
980 PEN #3,1:PRINT#3:PRINT#3,"  Bet on four numbers arr
anged in a square"
990 INPUT#3,"How much do you wish to bet:"m
1000 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 970
1010 INPUT#3,"What is the top-left number:"n
1020 IF n<1 OR n>32 OR n<INT(n) THEN GOSUB 1860:GOTO
970
1030 FOR a=1 TO 36 STEP 3:IF n=a THEN GOSUB 1860:GOTO
970 ELSE NEXT
1040 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
en carre"
1050 IF n=0 THEN n(1)=1:n(2)=2:n(3)=3 ELSE n(1)=n:n(2)
=n+1:n(3)=n+2
1060 PEN #3,1:PRINT#3:PRINT#3,"  Bet on the two adjacent ro
ws:"
1070 PEN 1:LOCATE a(n,4),a(n,5):PRINT CHR$(144):LOCATE
a(n(1),4),a(n(1),5):PRINT CHR$(144):LOCATE a(n(2),4),
a(n(2),5):PRINT CHR$(144)
1080 LOCATE a(n(3),4),a(n(3),5):PRINT CHR$(144):GOSUB 380
1090 IF rnd(v,1) OR rnd(v,1) OR n(2)=a(v,1) OR n(3)
=a(v,1) THEN mo=mo+(8*m) ELSE mo=mo-m
1090 GOTO 490
1100 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
transversal six"
1110 PEN #3,1:PRINT#3:PRINT#3,"  Bet on two adjacent ro
ws"
1120 INPUT#3,"How much do you wish to bet:"m
1130 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 1100
1140 INPUT#3,"What is the first  number in the two
 rows:"n
1150 IF n>34 OR n<1 OR n<>INT(n) THEN GOSUB 1860:GOTO
1100
1160 FOR a=1 TO 34 STEP 3:IF a=n THEN 1170 ELSE NEXT:G
OSUB 1860:GOTO 1100
1170 FOR a=1 TO a:n(a)=n-(1-a):NEXT:PEN #3,2:CLS #3:P
LOT 0,0:DRAW 400,0:PRINT#3,"  transversal six"
1180 PEN #3,1:PRINT#3:PRINT#3," You have bet"n"on":IFD
e=1 TO a:PRINT#3,n(a):NEXT
1190 PEN 1:FOR a=1 TO a:LOCATE a(n(a),4),a(n(a),5):PRI
NT CHR$(144):NEXT:GOSUB 380
1200 FOR a=1 TO a:IF a(v,1)=n(a) THEN mo=mo+(5*m) ELSE
NEXT:mo=mo-m
1210 GOTO 490
1220 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
colonne"
1230 PEN #3,1:PRINT#3:PRINT#3," Bet on one of three co
lumns"
1240 INPUT#3,"How much do you wish to bet:"m
1250 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 1220
1260 INPUT#3,"Which column do you wish to bet on:"n
1270 IF n>3 OR n<1 OR n<>INT(n) THEN GOSUB 1860:GOTO 1
220
1280 IF n=1 THEN FOR a=1 TO 36 STEP 3:n(INT(a/3)+1)=a:
NEXT ELSE IF n=2 THEN FOR a=2 TO 36 STEP 3:n(INT(a/3)+
1)=a:NEXT ELSE FOR a=3 T
O 36 STEP 3:n(INT(a/3)+1)=a:NEXT
1290 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
colonne"
1300 PEN #3,1:PRINT#3:PRINT#3," You have bet"n"on colo
nne"
1310 PEN 1:IF n=1 THEN LOCATE 3,14:PRINT CHR$(144) ELS
E IF n=2 THEN LOCATE 14,14:PRINT CHR$(144) ELSE LOCATE
5,14:PRINT CHR$(144)
1320 GOSUB 380:FOR a=1 TO 12:IF n(a)=a(v,1) THEN mo=mo
+(2*m) ELSE NEXT:mo=mo-m
1330 GOTO 490
1340 PEN #3,2:CLS #3:PRINT#3,"  dozen"
1350 PEN #3,1:PRINT#3:PRINT#3," Bet on first dozen (
P: 1-12) or second dozen ( M: 13-24) or third dozen (
D: 25- 36)"
1360 INPUT#3,"How much do you wish to bet:"m
1370 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 1340
1380 PRINT#3:PRINT#3,"Which dozen do you  wish to bet
 on press P,M,D"
1390 a$=UPPER$(INKEY$):IF a$<>"P" AND a$<>"M" AND a$<>
"D" THEN 1390
1400 IF a$="P" THEN a$="first":FOR a=1 TO 12:n(a
)=a:NEXT:LOCATE 8,14:PRINT CHR$(144)
1410 IF a$="M" THEN a$="second":FOR a=13 TO 24:n(a-12)
=a:NEXT:LOCATE 7,14:PRINT CHR$(144)
1420 IF a$="D" THEN a$="third":FOR a=25 TO 36:n(a-24)=
a:NEXT:LOCATE 6,14:PRINT CHR$(144)
1430 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
dozen"
1440 PEN #3,1:PRINT#3:PRINT#3," You have bet"n"on the
 a$" dozen"
1450 GOSUB 380:FOR a=1 TO 12:IF n(a)=a(v,1) THEN mo=mo
+(2*m) ELSE NEXT:mo=mo-m
1460 GOTO 490
1470 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
high or low"
1480 PEN #3,1:PRINT#3:PRINT#3," Bet on Low numbers  (
1-18) or high numbers (19-36)"
1490 INPUT#3,"How much do you wish to bet:"m
1500 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 1470
1510 PRINT#3:PRINT#3,"Which numbers do you wish to bet on p
ress L,H"
1520 a$=UPPER$(INKEY$):IF a$<>"L" AND a$<>"H" THEN 152
0
1530 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
high or low"
1540 PEN 1:IF a$="L" THEN LOCATE 7,3:PRINT CHR$(144) E
LSE LOCATE 7,3:PRINT CHR$(144)
1550 PRINT#3:PRINT#3,"you have bet"n"on ":IF a$="L" T
HEN PRINT#3,"low":PRINT#3,"high"
1560 GOSUB 380:IF a(v,1)=0 THEN PRINT#3:PRINT#3:PRINT#
3,"  IMPRISONED"GOSUB 380:IF a(v,1)=0 THEN mo=mo-10.
5m:GOTO 490
1570 IF a$="L" AND a(v,1)<=18 THEN mo=mo+(GOTO 490
1580 IF a$="H" AND a(v,1)>19 THEN mo=mo+(GOTO 490)
1590 mo=mo-m:GOTO 490
1600 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
red or yellow"
1610 PEN #3,1:PRINT#3:PRINT#3," Bet on Red numbers or
 yellow numbers"
1620 INPUT#3,"How much do you wish to bet:"m
1630 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 1600
1640 PRINT#3:PRINT#3,"Which would you like to bet on p
ress R,Y"
1650 a$=UPPER$(INKEY$):IF a$<>"R" AND a$<>"Y" THEN 165
0
1660 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
red or yellow"
1670 PEN 1:IF a$="R" THEN LOCATE 2,10:PRINT CHR$(144)
ELSE LOCATE 2,10:PRINT CHR$(144)
1680 PRINT#3:PRINT#3,"you have bet"a"on ":IF a$="R" T
HEN PRINT#3,"red" ELSE PRINT#3,"yellow"
1690 GOSUB 380:IF a(v,1)=0 THEN PRINT#3:PRINT#3:PRINT#
3,"  IMPRISONED"GOSUB 380:IF a(v,1)=0 THEN mo=mo-10.
5m:GOTO 490
1700 IF a$="R" AND a(v,1)=2 THEN mo=mo+(GOTO 490
1710 IF a$="Y" AND a(v,1)=3 THEN mo=mo+(GOTO 490
1720 mo=mo-m:GOTO 490
1730 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
odd or even"
1740 PEN #3,1:PRINT#3:PRINT#3," Bet on Odd numbers or
 Even numbers"
1750 INPUT#3,"How much do you wish to bet:"m
1760 IF m<0 OR m>mo THEN GOSUB 1860:GOTO 1730
1770 PRINT#3:PRINT#3,"Which would you like to bet on p
ress E,O"
1780 a$=UPPER$(INKEY$):IF a$<>"O" AND a$<>"E" THEN 178
0
1790 PEN #3,2:CLS #3:PLOT 0,0:DRAW 400,0:PRINT#3,"
odd or even"
1800 PEN 1:IF a$="O" THEN LOCATE 1,8:PRINT CHR$(144) E
LSE LOCATE 7,8:PRINT CHR$(144)
1810 PRINT#3:PRINT#3,"you have bet"a"on ":IF a$="O" T
HEN PRINT#3,"odd" ELSE PRINT#3,"even"
1820 GOSUB 380:IF a(v,1)=0 THEN PRINT#3:PRINT#3:PRINT#
3,"  IMPRISONED"GOSUB 380:IF a(v,1)=0 THEN mo=mo-10.
5m:GOTO 490
1830 IF a$="O" AND a(v,1)/2<INT(a(v,1)/2) THEN mo=mo+
m:GOTO 490
1840 IF a$="E" AND a(v,1)/2=INT(a(v,1)/2) THEN mo=mo+
m:GOTO 490
1850 mo=mo-m:GOTO 490
1860 SOUND 1,2625,30:SOUND 1,0,10,15:SOUND 1,1017,6
0,15:RETURN
1870 PRINT CHR$(22)+CHR$(0):CLS #5:PEN a(v,1),0:LOC
ATE 15,14:PRINT RIGHT$(STR$(a(v,1)),LEN(STR$(a(v,1)))-
1)
1880 PRINT:PRINT CHR$(22)+CHR$(0):c=1:FOR a=1 TO 40:BO
RDER INT(RND(1)*28):SOUND 1,INT(RND(1)*4000),2,15:PEN
c:LOCATE a(v,1),4:a(a
v,1),5):PRINT CHR$(a(v,1),6):c=c+1:IF c>4 THEN c=
1
1890 FOR t=1 TO 30:NEXT:NEXT:BORDER 19:PRINT CHR$(22)+
CHR$(1):TAG:RETURN
1900 MODE 1:BORDER INT(RND(1)*27):INK 2,3,12:INK 3,20:
```

(continued on page 195)

REWRITE HISTORY THIS WEEKEND!

All action strategy games from SSI - - the world's No.1 war game company

At last here is your chance to see how you shape up as a General in a real battle! The pages of history record the triumphs and failures as Eisenhower, Montgomery, Rommel and Von Rundstedt battled in Europe and North Africa. But with a clear thinking strategist like yourself in command perhaps the historians would have had a different story to write!

U.S. Gold is proud to present four of the best strategy games by Strategic Simulations Incorporated:

KNIGHTS OF THE DESERT pitches the British Forces of Montgomery against the might of Rommel and his Panzer Divisions in the classic North African campaign of 1941.

BATTLE FOR NORMANDY commences on 'D-Day' June 6th 1944 and relives the Allied Forces attempt to smash Hitler's Atlantic Wall.

TIGERS IN THE SNOW reconstructs the legendary Battle of the Bulge as in December 1944 the Panzer Divisions of Von Rundstedt try one last gamble in a desperate attempt to halt Eisenhower's advancing Allied lines.

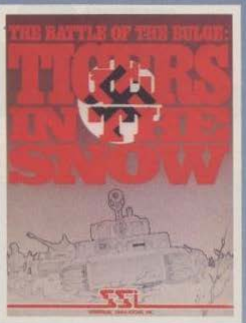
Who will be the victor and who the vanquished?

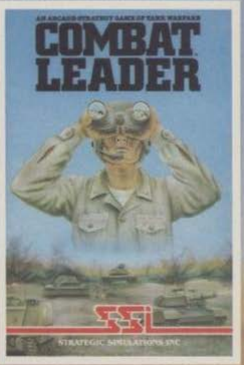
Only you have the answers!

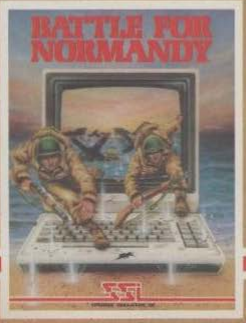
And if you're looking for strategy with arcade action then **COMBAT LEADER** will test all your wits, depth of thought and reflexes in this toughest of battle challenges!

64 ATARI

Spectrum versions available soon!







£14.95 disk & cassette

THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:
BOOTS WHSMITH JOHN MENZIES WILDINGS WOOLWORTH

U.S. GOLD
All American Software

DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020.

SSI

STRATEGIC SIMULATIONS INC.

Is this new F
another
First read th

erguson just monitor? e small print.

A glance at the screen of our new MC01 will tell you how far it is from being just a monitor. Or just a 14" portable colour TV.

One advantage of our double act is worth repeating, if only because it's another Ferguson first:

Electronic switching lets you change functions automatically from monitor to video recorder to TV.

You can plug in any combination; leave them permanently connected; and wave goodbye to spaghetti junction round the back.

Convenience is matched by performance. Computer graphics and picture quality are far better through our RGB and Composite Video inputs than through the aerial socket of an ordinary TV.

Computer audio output sounds better through the speaker of the MC01. (And if the beeps are too loud, you can turn down the volume.)

The full potential of the MC01 will be revealed by your Ferguson Dealer; as will the optional Battery Converter which makes it totally portable; and the matching computer-dedicated cassette recorder 3T31.

If total dedication is what you're after, he'll tell you about our outstanding new 12" monochrome monitor MM02, which is particularly suited to text applications.

But if you need a monitor for a home computer, it makes sense to get one that's also a colour TV. Especially when it only costs around £229.

And if you want a portable colour TV, why not get one that's also a monitor? In the Ferguson Monitor Colour TV, you get the state of two arts in one.

THORN EMI **FERGUSON** TX

MICROPOWER MICROPOWER MICROPOWER

LOOKING FOR A HOME COMPUTER?

ALL ROADS LEAD TO MICRO POWER

MEMOTECH MTX500
MEMOTECH MTX512

ONLY £275 £199

ONLY £315 £275

An excellent choice for both the beginner and the Spectrum owner wishing to upgrade.

Features: Z80A processor, SN76489A sound chip (the same as in the BBC Micro), 256 x 192 graphics resolution, 16 colours, 32 sprites two Atari-type joystick ports, composite video socket, number pad. Sophisticated utilities to aid programming include built-in Assembler/Disassembler and monitor.

COMMODORE 64 PLUS COMPATIBLE CASSETTE RECORDER

SPECIAL PRICE £268.95 £219.95

Features: 64K, Microsoft BASIC, 16 colours, 8 multi-coloured sprites, sound synthesiser (producing the best sound on any micro), 320 x 200 graphics resolution, four function keys, two Atari-type joystick ports, cartridge slot, parallel printer interface.

AMSTRAD CPC464 WITH BLACK AND WHITE MONITOR

£239

AMSTRAD CPC464 WITH COLOUR MONITOR

£349

Features: built-in cassette recorder, 64K of memory, 27 colours, 80 column text mode, 640 x 200 graphics resolution, joysticks port, separate number pad.

We also stock a wide range of monitors, disk drives, printers, joysticks, light pens, books, software and much more! Please send for our complete list.

MAIL ORDER ADDRESS:
DEPT. PCT11
MICRO POWER LTD.
SHEEPSCAR HOUSE
SHEEPSCAR STREET SOUTH
LEEDS LS7 1AD
Tel: (0532) 434006

SHOWROOM ADDRESS:
MICRO POWER LTD.
NORTHWOOD HOUSE
NORTH STREET
LEEDS LS7 2AA
Tel: (0532) 458800

MICRO POWER

BBC MODEL B *PLUS* CASSETTE RECORDER *AND* 5 MICRO POWER *OR* SELECTED ACORNSOFT TAPES

SPECIAL OFFER! £399

Features: 32K, BBC BASIC (the fastest on any home computer), 8 display modes, 16 colours, 640 x 256 high resolution graphics, 3 voice sound plus noise channel, RS423 and Centronics printer interfaces, joystick port, built-in Assembler, 10 user definable function keys. Complete with a 16 program cassette and 512 page User Guide.

ACORN ELECTRON *PLUS* CASSETTE RECORDER *OR* 5 MICRO POWER TAPES

SPECIAL OFFER! £199

The scaled down version of the BBC Micro. Features: BBC BASIC, 32K, 7 display modes (including 80 column text mode and 640 x 256 graphics resolution), 16 colours, 9 octave sound plus noise channel, built-in Assembler. Complete with an Introductory Cassette containing 16 programs, a User Guide, and a book: "Start Programming on the Electron".

SINCLAIR SPECTRUM 48K PLUS FREE 6-PACK SOFTWARE

£129.95

PRICES CORRECT AT TIME OF GOING TO PRESS. ALL PRICES INCLUSIVE OF VAT. HIRE PURCHASE AVAILABLE. PLEASE CONTACT US FOR FURTHER DETAILS. CARRIAGE FREE FOR BBC AND MEMOTECH. ALL OTHER COMPUTERS £5.00. U.K. MAINLAND ONLY.
AMPLE FREE PARKING!

MICROPOWER MICROPOWER MICROPOWER

(continued from page 190)

```
PEN 2:PRINT TAB(16)"ROULETTE"
1910 PEN 3:PRINT:PRINT:PRINT"Instructions":PRINT:PEN 1
:PRINT" This is a version of the famous casino game "
ROULETTE in which you w
ill play against the " AMSTRAD CPC-464"+CHR$(161)+".Yo
u will be given $500 to begin with."
1920 PRINT:PRINT" You can borrow up to $5000 when you
have less than $50,there is no house limit on g
ambling but the bank wi
ll break on $50 million."
1930 PRINT:PRINT:PRINT" press any key for instruct
ions on how to gamble."
1940 IF INKEY$="" THEN 1940
1950 CLS:PEN 2:PRINT TAB(16)"ROULETTE"
1960 PEN 3:PRINT:PRINT:PRINT"Instructions."+PRINT:PRIN
T"en plein":PEN 1:PRINT" bet on any on of the 37 numbe
rs (including 0)
,the odds are 35-1."
1970 PEN 3:PRINT:PRINT"a cheval":PEN 1:PRINT" bet on t
wo either horizontal or vertically adjacent nu
mber the odds are 17-1."
1980 PEN 3:PRINT:PRINT"transversale pleine":PEN 1:PRINT" b
et on a row of three numbers.You must"
1980 PRINT" enter the first of the three numbers. od
ds are 11-1":PRINT:PEN 3:PRINT"en carre":PEN 1:PRINT"
four numbers arranged on
the table in the shape of a square e.g. 7,8,10,11.
The odds are 8-1":PEN 2
1990 LOCATE 1,25:PRINT" press any key to continu
e":IF INKEY$="" THEN 1990
2000 CLS:PEN 2:PRINT TAB(16)"ROULETTE":PEN 3:PRINT:PRI
NT:PRINT"Instructions."
2010 PRINT:PRINT"transversal six":PEN 1:PRINT" bet on
two adjacent rows,and you must input the first & low
est number in the two r
ows.the odds are 5-1":PEN 3:PRINT:PRINT"a colonne":PEN
1
2020 PRINT" bet on of one three colouse of twelve nu
mbers,the odds are 2-1":PRINT:PEN 3:PRINT"a dozen":PEN
1:PRINT" bet on one of
three sets of twelve numbers (1-12,13-24,25-36) t
he odds are 2-1":PRINT:PEN 3:PRINT"low or high":PEN 1
2030 PRINT" bet on either low numbers (1-18) or hi
gh (19-36) the odds are 1-1":PEN 2:LOCATE 1,25:PRINT"
PRESS ANY KEY TO C
ONTINUE"
2040 IF INKEY$="" THEN 2040
2050 CLS:PEN 2:PRINT TAB(16)"ROULETTE":PEN 3:PRINT:PRI
NT:PRINT"Instructions."
2060 PRINT:PRINT"red or yellow":PEN 1:PRINT" bet on ei
ther red or yellow numbers the odds are 1-1":PRINT:PEN
3:PRINT"odd or even":PE
N 1:PRINT" bet on odd numbers or even numbers the odd
s are 1-1":PRINT:PEN 3:PRINT"imprisoned":PEN 1
2070 PRINT" If you have bet on odd,even,red,yellow, hi
gh or lowand the ball lands on 0 then the bet is
IMPRISONED and the ball
is thrown again.if it again lands on 0 then the bank
takes half the bet."
2080 RESTORE
2090 READ A:IF A=-1 THEN 2110
2100 SOUND 1,A,25,15:GOTO 2090
2110 PEN 2:LOCATE 1,25:PRINT" PRESS ANY KEY TO
PLAY"
2120 IF INKEY$="" THEN 2120 ELSE 100
2150 IF mo>50 THEN 520
2160 CLS #3:PRINT#3," borrowing money":PRINT#3:PRINT
#3,"you can borrow up to"bor;:INPUT #3,"how much do yo
u wish to borrow":IF a
>bor OR a<0 THEN 2140
2150 mo=mo+bor-bor-mibor:GOTO 490
2160 CLS:MODE 0:PRINT:PRINT" You have broken the bank.
Would you like to start again (Y/N)"
2170 a$=UPPER$(INKEY$):IF a$="Y" AND a$<>"N" THEN 217
0
2180 IF a$="Y" THEN RUN
```

Quadruplets

Victor Card,
Horley,
Surrey.

QL

QUADRUPLETS: a captivating game of vertical strategy in which the player tries to out-think the computer. The game is simple in concept but can develop into a challenging battle of tactics which makes quadruplets an absorbing game for all members of the family.

A modern, micro-based version of noughts and crosses the basic objective is to complete a line of four counters in the playing grid — vertically horizontally or diagonally — before the QL does the same. This sounds easy enough, but the computer makes sure that it's not. The limitations imposed by the vertical play of this game makes it necessary for the player to think ahead, or risk being out-manoeuvered by the micro.

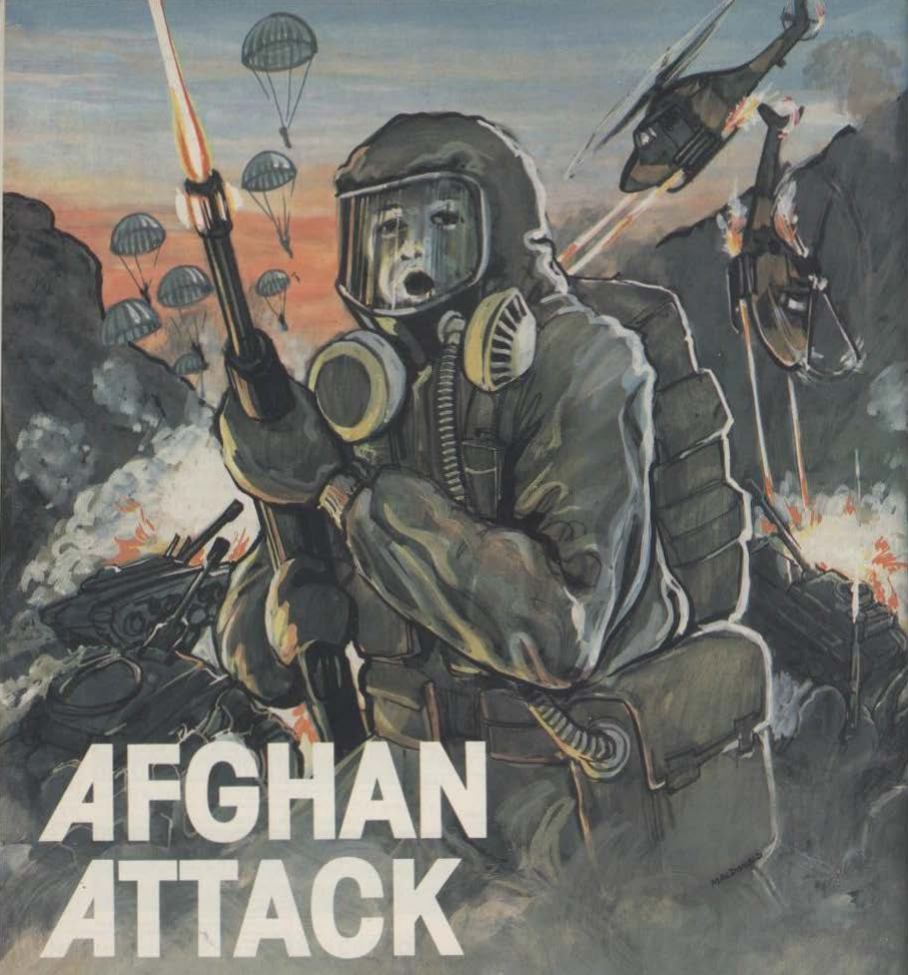
At each turn, the counter is placed above the required column using the cursor keys. Pressing the spacebar will the drop the counter into the column selected until it comes to rest upon another counter or comes to rest upon the bottom of the grid. You should be careful not to press too long on the spacebar, however, since the QL has automatic repeat on all keys and a very effective keyboard buffer which can mean that you inadvertently play several goes ahead if you delay on the keys.

Although written in Basic, the program has been designed to make full use of the advanced graphics facilities of the QL and a reasonable fast and powerful game ensues. The human player always plays the green counters, and the computer always plays red. These colours have been selected to give effective displays on both colour and monochrome televisions and monitors. There are three optional skill levels and the previous loser always takes first go. The computer visually displays a winning line when one is achieved and keeps a running tally of the game score.

If typing in a program of this length proves too daunting a task then I can supply a copy on Microdrive cartridge for a cost of £7.50 including postage and packing. Please send all enquiries to Victor Card, 5 Cartersmead Close, Horley, Surrey RH6 9LG.

```
100 initialise
110 REPeat again
120 mode=0:CLS:CLS C2:DIM b(5,6)
150 FOR i=10 TO 130 STEP 20
140   FOR j=10 TO 110 STEP 20
150     INK 1:FILL 1:CIRCLE i,j,9
160   NEXT j
170 NEXT i
180 REPeat game
190 IF colour=4 THEN
200   colour=2
210   ELSE
220   colour=4
230 END IF
240 IF colour=4 THEN
250   humansur=0
260   ELSE
270   ds=0
280 END IF
290 check_fours row,colour
300 IF winner=colour THEN
310   show winner:EXIT game
320 END IF
330 gsum=gsum+1
340 IF gsum=82 THEN
350   INK 0,7:AT 0,1:PRINT 0$,"stale mate":EXIT ga
me
360 END IF
370 END REPeat game
380 show_score:ter_new_game
390 END REPeat again
400 REMark ****************
410 DEFine PROCedure initialise
420 REMark ****************
430 MODE 0:PAPER 1:CLS:INK 7:colmark=0
440 DEF FN column_score(a):DIM name$(8)
450 WINDOW 260,160,180,50:SCALE 120,-3,0
460 PAPER 0:CLS:BORDER 2,4
470 PAPER 6:CLS:CSIZE 0,2
480 WINDOW E2,150,160,50,50
490 PRINT:PRINT "hello i am QL\\\what's your name"
500 INPUT name$
510 CLS:AT 1,4:PRINT "Let's play"
520 RESTORE
530 FOR i=1 TO 7
540 READ x,y,r
550   AT x,y:PRINT "O":AT x,y:PRINT "L"
560 NEXT i
570 INK 4:FLASH 1
580 AT 0,0:PRINT "quadrup":AT 0,13:PRINT "ms
590 DATA 0,8,9,6,7,10,7,6,11,8,5,12,9,6,11,10,7,10,11,
9,9
600 FLASH 0:FOR i=1 TO 5000:NEXT i:CLS
610 REPeat query
620   AT 0,1:PRINT "skill level (1-3)?"
630   skill$=INKEY$:i=1
640   IF skill$="1" OR skill$="2" OR skill$="3" THEN E
XIT query
650 END REPeat query
660 OPEN #0,scr 260x30a100x20:SCALE #0,120,-3,0
670 PAPER #0:CLS #0
680 dl_score=0:your_score=0:colour=2
690 END DEFine initialise
700 REMark ****************
710 DEFine PROCedure humansgo
720 REMark ****************
730 AT E2,5,0:PRINT E2, use keys i-"\\\CHR$(108)+ and
 j:CHR$(107)+ to move"\\ space bar \\ to play
740 i=0:j=0:bin=0
750 INK 0:colour:FILL 0:CIRCLE 0,i,j,50
760 REPeat voorgo
770 a$=INKEY$:i=i
780 IF a$=" " AND b(0,col)=0 THEN
790   drop:EXIT voorgo
800 END IF
810 CLS #0
820 j=j+(ORD(a$)=200)-(ORD(a$)=192)
830 IF j<80 THEN j=80
840 IF j>130 THEN j=116
850 col=(j-80)/106
860 INK 0:colour:FILL 0:CIRCLE 0,i,j,50
870 END REPeat voorgo
880 END DEFine humansgo
890 REMark ****************
900 DEFine PROCedure drop
910 REMark ****************
920 CLS 0:row=0
930 REPeat until row=
940 INK colour:FILL 1:CIRCLE 10+col*20,110-row*20,9
950 IF row=5 THEN
960   b(row,col)=colour
970   END DEFine drop
980 END IF
990 IF b(row+1,col)=0 THEN
1000   b(row,col)=colour
1010   END DEFine drop
1020 END IF
1030 FOR i=1 TO 100:NEXT i
1040 INK 1:FILL 1:CIRCLE 10+col*20,110-row*20,9
1050 row=row+1
1060 END REPeat until rest
1070 END DEFine drop
1080 REMark ****************
1090 DEFine PROCedure GLsgo
1100 REMark ****************
1110 s=80:y=50:col=0:vlCLS C2
1120 find_best_move
1130 REMark svgo
1140 FOR i=1 TO 100:NEXT i
1150 CLS C8
1160 IF ls=80:l0s=col THEN
1170   END DEFine GLsgo
1180 END IF
1190 s=s-10
1200 INK C8,colour:FILL C8,1:CIRCLE C8,x,y,50
1210 END REPeat svgo
1220 END DEFine GLsgo
1230 REMark ****************
1240 DEFine PROCedure check_fours(row,mark)
1250 REMark ****************
1260 winner=0
1270 search row,mark,0,1
1280 IF winner>0 THEN
1290   rowmark>0:colmark=1
1300   END DEFine check_fours
1310 END IF
1320 search row,mark,-1,-1
1330 IF winner>0 THEN
1340   rowmark>0:colmark=1
1350   END DEFine check_fours
1360 END IF
1370 search row,mark,1,-1
1380 IF winner>0 THEN
1390   rowmark>0:colmark=1
1400   END DEFine check_fours
1410 END IF
1420 search row,mark,1,0
1430 IF winner>0 THEN
1440   rowmark>0:colmark=0
1450 END IF
1460 END DEFine check_fours
1470 REMark ****************
1480 DEFine PROCedure search(row,mark,deltax1,deltay1)
1490 REMark ****************
1500 count=1:points=1
1510 searchl row,mark,deltax1,deltay1
1520 searchl row,mark,-deltax1,-deltay1
1530 IF count>=4 THEN winner=colour
1540 END DEFine search
1550 REMark ****************
1560 DEFine PROCedure searchl(row,mark,deltax,deltay)
1570 REMark ****************
1580 newcount=newcount+col:start=0
1590 REPeat look
1600 newrow=row+deltax
1610 IF newrow>0 OR newrow>5 THEN EXIT look
1620 newcol=newcol+deltay
1630 IF newcol>0 OR newcol>6 THEN EXIT look
1640 IF b(newrow,newcol)=colour THEN
1650   points=points+1
1660   IF start=0 THEN count=count+1
1670 END IF
1680 IF b(newrow,newcol)<>colour THEN
1690 start=1
1700   IF b(newrow,newcol)=mark THEN EXIT look
1710   points=points+1
1720 END IF
1730 END REPeat look
1740 IF mark>0 AND points>=4 AND column_score(col)>1 T
HEN column_score(col)=column_score(col)+count-1
1750 END DEFine search
1760 REMark ****************
1770 DEFine PROCedure show_winner
1780 REMark ****************
1790 endrow=row:endcol=col
1800 newrow=row:newcol=col
1810 REPeat endpoint
1820 newrow=newrow+deltax
1830 IF newrow>0 OR newrow>5 THEN EXIT endpoint
1840 newcol=newcol+deltay
1850 IF newcol>0 OR newcol>6 THEN EXIT endpoint
1860 IF b(newrow,newcol)<>colour THEN EXIT endpoint
1870 endrow=newrow:endcol=newcol
1880 END REPeat endpoint
1890 FOR i=1 TO 20
1900 INK 1:flash counters
1910 INK winner:flash counters
1920 NEXT i
1930 END DEFine show_winner
1940 REMark ****************
1950 DEFine PROCedure flash_counters
1960 REMark ****************
1970 FOR j=0 TO count-1
1980 newrow=endrow-(deltax*j)
1990 newcol=endcol-(deltay*j)
2000 x=20+(newcol)*110-20:y=row
2010 FILL 1:CIRCLE x,y,9
2020 END FOR j
2030 END DEFine flash_counters
2040 REMark ****************
2050 DEFine PROCedure find_best_move
2060 REMark ****************
2070 col=-1
2080 FOR i=0 TO 6:column_score(i)=2:NEXT i
2090 REPeat for_all_cols
2100 col=col+1
2110 IF col>6 THEN EXIT for_all_cols
2120 x=80+106*col:row=1
2130 CLS C8:INK C8,colour:FILL C8,1:CIRCLE C8,x,y,50
2140 REPeat for_all_rows
2150 IF row>4 THEN EXIT for_all_rows
2160 IF b(row+1,col)<>0 THEN EXIT for_all_rows
2170 row=row+1
2180 END REPeat for_all_rows
2190 IF row=1 THEN
2200   column_score(col)=-1
2210   NEXT for_all_cols
```

(continued on page 197)



AFGHAN ATTACK

A 96K PURE TEXT MACHINE CODE ADVENTURE FOR THE 48K SPECTRUM (IN TWO PARTS)

A large build up of Soviet troops is forming on the South Eastern Pakistan border, with probable hostile intentions. Troops and supplies travel the fragile Eastern Kabul road through unoccupied territory. Your role is to disrupt these troop movements, harass supplies and prevent the Soviets from attaining their objectives. You have British Paratroopers; ground to air missiles for attacking their airfield and destroying helicopters; plus rebel guerillas to lay ambush on troops and convoys.

Please send me ..... copy(ies) of 'AFGHAN ATTACK' at £9.95 each. I enclose a cheque/P.O. made payable to 'Southern Software' to the value of .....

Name .....

Address .....

.....

.....

.....

SOUTHERN SOFTWARE, 6 The Hillway, Fareham, Hants. PO16 8BL.

(continued from page 195)

```
2220 END IF
2230 bjrow,col)=colour
2240 IF skill$(3)'' THEN
2250   check_fours row,0
2260 ELSE
2270   check_fours row,colour
2280 END IF
2290 IF winner=colour THEN
2300 bjrow,col)=0
2310   CLS (8):colum_score(col)=100
2320   END DEFine find_best_move
2330 END IF
2340 row=row-1
2350 IF row>-1 THEN
2360   bjrow,col)=colour
2370   check_fours row,colour
2380   IF winner=colour AND skill$='3' AND colcark(0)
THEN colum_score(col)=1
2390   bjrow,col)=0
2400   can_human_win row,4
2410   IF winner=4 THEN colum_score(col)=0
2420 END IF
2430 can_human_win row,0
2440 IF winner=4 THEN colum_score(col)=99
2450 colour=2:bjrow,col)=0
2460 IF col<6 THEN EXIT for_all_cols
2470 REPeat for_all_cols
2480 max=-1:n=0
2490 FOR i=0 TO 6
2500 IF colum_score(i)>max THEN n=n+1
2510 IF colum_score(i)>max THEN
2520   col=i:max=colum_score(i):n=0
2530 END IF
2540 NEXT i
2550 IF n>0 THEN END DEFine find_best_move
2560 where=RND(n)
2570 FOR i=0 TO 6
2580 IF colum_score(i)=max THEN
2590   where=where-1
2600   IF where=-1 THEN col=i
2610 END IF
2620 NEXT i
2630 END DEFine find_best_move
2640 REMark ******************************
2650 DEFine PROCedure can_human_win(row,mark)
2660 REMark ******************************
2670 colour=4:bjrow,col)=colour
2680 check_fours row,mark
2690 bjrow,col)=0
2700 END DEFine can_human_win
2710 REMark ******************************
2720 DEFine PROCedure update_score
2730 REMark ******************************
2740 IF winner=2 THEN GL_score=GL_score+1
2750 IF winner=4 THEN your_score=your_score+1
2760 CLS (0):PRINT CO,'  SCORE          GL '\GL_score,name$;
' \your_score
2770 END DEFine update_score
2780 REMark ******************************
2790 DEFine PROCedure offer_new_game
2800 REMark ******************************
2810 REPeat question
2820 CLS (2)
2830 AT (2,8,0):PRINT (2),"do you want \"another game\"?"
yes or no"
2840 a$=INKEY$(-1)
2850 IF "y" OR a$="y" THEN EXIT question
2860 IF a$="n" OR a$="n" THEN STOP
2870 END REPeat question
2880 CLS (0)
2890 END DEFine offer_new_game
```

Hard Lines

Nigel Bates,
Bradford,
West Yorkshire.

SPECTRUM

THIS PROGRAM has been written on a 48K ZX Spectrum but will run on both 16K and 48K machines. The machine code is stored in data statements from line 30 to line 110 and is Poked into memory by line 10 and line 100, the machine code is used to move and display the scores and the ink jet.

The rest of the program is in Basic and controls the number of lives, screen number, screens, bonus and high scores. It makes full use of the 16K of memory, colour, sound, high resolution graphics and includes four different screens.

Program notes.

lines	
10-110	Pokes machine code into memory
998-1000	Initialises game
1000-1020	Initialises go and calls the machine code
1020-1160	Selects bonus
2000-2070	Sub routine to draw screens
2100-2499	Data for screens

Variables.

h$	Highscore	(6 digits)
a$	Score	(6 digits)
b$	Bonus	(4 digits)
c$	Messages	
l	Lives	
s	Level or Screen	

Other variables have misellaneous uses — a,b,x,y and n$.

Just type in the program as listed and run. To save use

SAVE "Hard Lines"

The program uses either the Sinclair Interface 2 or the keys: 6 Left; 7 Right; 8 Down; 9 Up; 0 Accelerate.

Guide the ink jet around the maze to try and reach the centre without hitting either the walls of the maze or your trail. You have a limited ink supply and are timed, if you can reach the centre before your time reaches 600 then you are awarded a bonus of 1,000 points plus a 500 point bonus for reaching the centre dot. If you complete a maze you are confronted with a new maze, there are four different screens and then it returns to the first screen.

```
   1 LET h$="000000"
   5 BORDER 0: PAPER 0: INK 7: B
RIGHT 1
  10 RESTORE : FOR a=32256 TO 32
450: READ : POKE a,n: NEXT a
  20 LET c$=""
  30 DATA 30,23,1,8,174,62,246,2
14,254,33,255,185,62,239,219,254
,230,30,254,30,62,1,123,95,203,1
03,32,1,13,203,95,32,1,12,203,87
,32,1,4,203,79,32,1,5,86,62,0,21
1,87,62,255,219,254
  32 DATA 203,71,32,7,53,32,1,52
,21,40,4,52,21,32,241,203,71,32,
3,61,32,1,52,62,64,136,48,2,6,1,
120,254,0,32,2
  34 DATA 6,191,167,120,205,177,
34,6,62,1,15,16,253,193,86,18
,119,186,200,167,1,48,5,58,120,
92,33,255,127,190,40,16,119,42,5
,92,62,255,119,62,255,119,42,5,9
5,62,247,48,6,33,247,127,119,62
,62,215,62,0,215,62,11,215,205,0
,16,
  35 DATA 193,33,254,125,53,32,2
1,54,8,197,43,70,14,0,229,180,20
0,11,43,54,129,225,193,52,62,17
,190,200
  39 DATA 62,251,219,254,203,95,
194,5,126,201
  100 RESTORE 110: FOR a=32512 TO
32536: READ n: POKE a,n: NEXT a
  110 DATA 126,214,10,32,5,43,52,
35,24,12,118,129,215,62,8,
215,62,8,215,43,16,230,201
  998 POKE 32253,0: FOR a=32750 -
0 TO 32767: READ b: POKE a,b: NEXT a
  999 LET l=INT pi: LET s=l/ l
 1000 INK RND+4+INT PI: CLS
 1010 l=l-1
 1021 FOR a=l-1 TO 21: PRINT "
": NEXT a: GO SUB 2000
 1022 FOR a=32750 TO 32766: POKE
a,a-a: NEXT a: POKE 32253,a-a: P
LOT 126,88: DRAU 2,a-a: DRAU a-a
,-2: DRAU -2,a-a: DRAU a-a,2
 1030 PRINT AT a-3,2: INK 0: PAPE
R 1;"HARD LINES"  BY NIGEL BATES
 3";#1;AT s-1,1;"PAPER 3;SCORE
 HIGH SCORE ";PAPER 1;
 INK 7;h$,"LIVES";(l;AT 1,12;"LE
VEL";(s;AT 1,22;"TIME";AT 0,0;
LET bc=USR 32256
 1040 LET b=INT (bc/256): LET c=b
-c*256
 1050 LET a$="000000": FOR a=1 TO
6: LET a$(a)=CHR$ (PEEK (32753+
a)+48): NEXT a
 1060 IF b<88 OR b>89 OR b=87) A
ND c=126 OR c=129 OR c=130) THE
N PRINT AT 5,6;"PAPER 1; INK 7
;"GREAT! NOW TRY THE NEXT LEVEL
": LET s=s+1: LET a$=STR$ (VAL a
$+500): LET b$="0500": LET c$="
EXTRA BONUS ": IF PEEK 32764(6 T
HEN LET a$=STR$ (VAL a$+1000): L
ET b$="1500": LET c$=c$+CHR$ 22+
CHR$ 14+CHR$ 14+"FANTASTIC"
 1070 IF c$="  THEN LET (a)=1 LE
T c$="  NO BONUS "+CHR$ 22+CHR$
 14+CHR$ 12+CHR$ 17+CHR$ 24+" HAR
D LINES ": LET b$="0000"
 1080 IF PEEK 32253=1 THEN LET
c$=" OUT OF INK "
 1085 IF VAL a$>VAL h$ THEN LET h
$=a$
 1090 IF l<1/s/3 THEN PRINT AT 13,1
2; INK 6; PAPER 5;a$/c$; LET c$="
GAME OVER": FOR a=0 TO 25 STEP 2
: PRINT AT 10,a; INK 2; PAPER 6;
c$((a-7)/2); NEXT a: FOR b=A TO 20
: NEXT b: INPUT "Another
game? (y/n)";c$: IF c$="y" THEN
GO TO 5
 1095 IF l<1/s/3 THEN STOP
 1100 PRINT AT 10,12; INK 6; PAPE
R 5;"BONUS";a$;AT 11,12; INK 7;
PAPER 3;c$;b$;AT 13,12;"
LASH ";PAPER 1;c$
 1101 IF LEN a$>6 THEN LET a$=(0
+a$: GO TO 1101
 1102 IF LEN h$>6 THEN LET h$="0
+h$: GO TO 1102
 1105 FOR a=1 TO 6: POKE 32753+a,
VAL a$(a): NEXT a
 1110 LET c$=""
 1120 IF VAL b$=0 THEN BEEP s/a,s
: BEEP s/a,-12: BEEP s/a,-24
 1130 IF VAL b$=500 THEN FOR a=0
TO 10: FOR b=s+5 TO s+10: BEEP
.02,b: NEXT b: NEXT a
 1140 IF VAL b$=1500 THEN FOR a=0
TO 20: FOR b=s+3 TO s+3+5: BEEP
.02,b: NEXT b: NEXT a: FOR a=5
TO 3 STEP -1: BEEP .1,b: NEXT
a
 1160 GO TO 1000
 2000 IF s>4 THEN LET s=s/s
 2001 RESTORE 2000+100*s
 2010 READ n$,x,y
 2020 IF n$="p" THEN PLOT x,y
 2030 IF n$="d" THEN DRAU x,y
 2040 IF n$="o" THEN OVER 1
 2050 IF n$="c" THEN READ r: CIRC
LE x,y,r
 2060 IF n$="x" THEN GO TO 2010
 2065 IF n$="a" THEN PRINT AT 10,12;
OVER 0
 2070 OVER 0: RETURN
 2100 DATA "p",88,8,"d",223,0,"d
",0,143,"d",-223,0,"d",-143,"p"
,102,32,"d",-51,0,"d",0,111,"d"
,51,0,"d",0,111,"p",48,47,"d",
159,0,"d",0,79,"d",-159,0,"d",0
,-79
 2110 DATA "p",64,64,"d",127,0,"
d",0,47,"d",-127,0,"d",0,-47,"p"
,76,76,"d",102,0,"d",0,28,"d",-
102,0,"d",0,-28,"p",16,159,"d",
-60,0,"d",209,16,"d",-60,60,"d"
,1,"p",209,100,"d",-60,-60,"p",
-12,0,"d",0,"p",207,99,"d",0,-1
,"p",-120,64,"d",0,0,"p",-76,89-
1,"d",0,-3,"p",195,60,"d",0,-3,"
9,9
 2200 DATA "p",16,16,"d",239,0,
"d",143,0,"d",-239,0,"d",0,-141,
"p",16,16,"d",231,135,"p",16,24
,"d",231,0,
 2210 DATA "p",16,151,"d",231,-10
5,"p",24,159,"d",231,-135,"p",12
,136,"d",0,143,"p",147,16,"d",0,
143
 2220 DATA "p",16,80,"d",239,0,"p
",16,96,"d",239,0,"p",16,80,"d",
16,0,"p",16,0,"p",100,80,"d",42,
0,"p",78,60,"d",8,"p",20,80,"d"
,5,0,"p",20,0,"p",
 2230 DATA "p",32,142,"d",8,-5,"p
",57,140,"d",-226,130,"d"
,0,5,"p",226,99,"d",0,-5,"p",
 2240 DATA "p",24,
 2300 DATA "p",16,8,"d",223,0,"d
",159,"d",-223,0,"d",-159,"p",
,8,0
 2310 DATA "p",247,16,"d",-231,0,
"d",143,"d",231,0,"p",16,32,"d"
,-231,0,"p",216,48,"d",0,-32,"p"
,16,64,"d",231,0,"p",16,80,"d",
1,0,"p",16,96,"d",231,0,"p",16,1
12,"d",231,0,"p",16,128,"d",231,
0,"p",16,144,"d",231,0
 2320 DATA "p",24,152,"d",231,0,
"p",24,40,"d",231,0,"p",24,56,"d"
,231,0,"p",24,72,"d",231,0,"p",2
4,88,"d",231,0,"p",24,104,"d",23
1,0,"p",24,120,"d",231,0,"p",24,
136,"d",231,0,"p",24,"d",231,
0
 2325 DATA "o",1,1,"p",200,120,"d
",10,0,"p",250,152,"d",5,0,"p",1
90,136,"d",-10,0,"p",150,104,"d"
,-5,0,"p",99,88,"d",-10,0
 2330 DATA "x",0,0
 2400 DATA "p",128,88,60,"c",128,
88,60,"c",128,88,40,"c",128,88,2
0,"c",128,88,"
 2410 DATA "o",1,1,"p",128,8,"d",
0,143,"p",126,143,"d",4,0,"p",89,
0,"d",0,-3
 2420 DATA "p",127,108,"d",3,0,"p"
,128,88,"d",0,0
 2499 DATA "x",0,0
```

Character definer

J Gardiner,
Wymondham,
Norfolk.

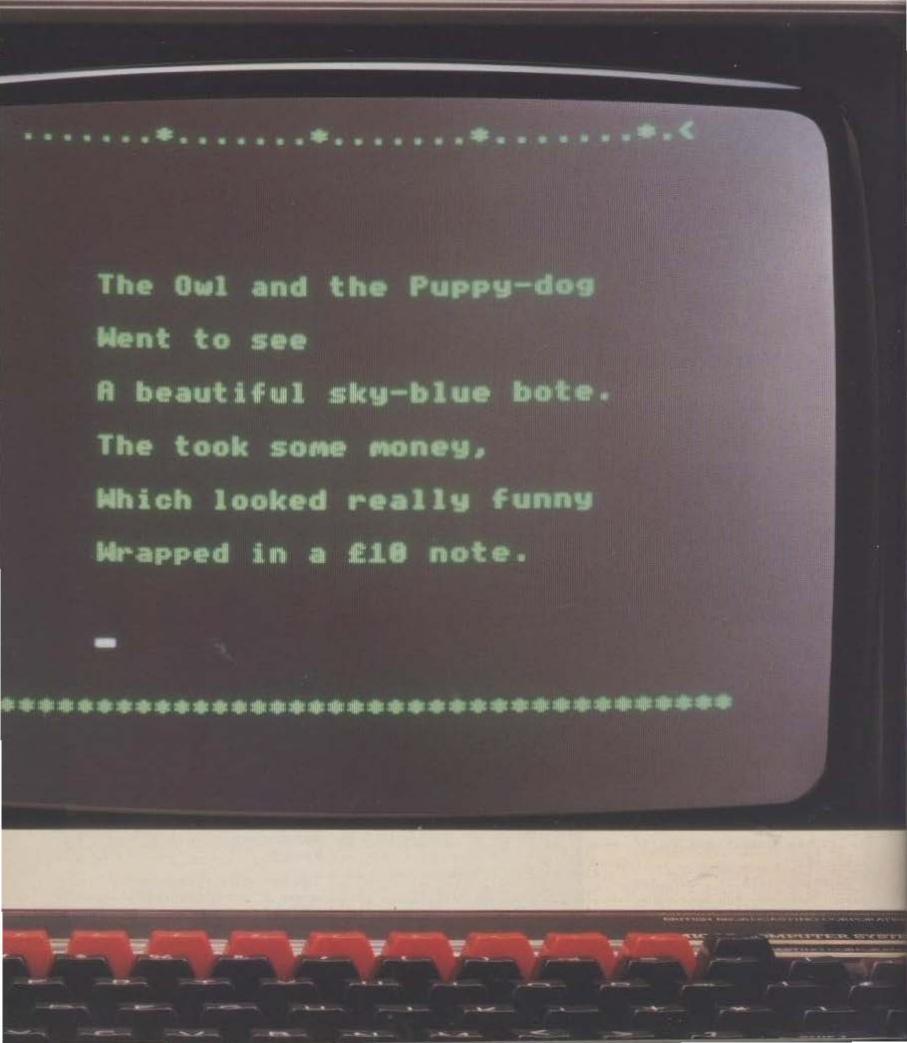
AMSTRAD

THIS PROGRAM is a comprehensive character definer. It is very user-friendly and allows redefinition of characters on the Amstrad CPC-464 micro.

As well as the standard "pixel-by-pixel"

(continued on page 201)

How to become
before committing



a great writer yourself to paper.

It takes only two minutes and £59.80 to transform your BBC Micro into the heart of a word processor with VIEW from Acornsoft.

The VIEW word processing system is programmed into a single chip, a 16K plug-in ROM. Once it's installed into your BBC Micro – a simple job for your local dealer – you just switch on and VIEW is operating. (You can switch to other programs, like BASIC, with a single command.)

VIEW is a professional system, yet it's surprisingly straightforward to use.

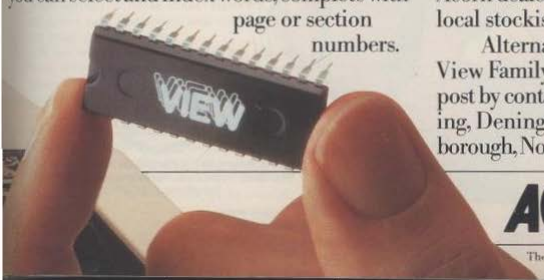
And it's so outstanding it's won the 1984 British Microcomputing Award for Home Software.

All you do is type out your text on the keyboard, and view it on the screen.

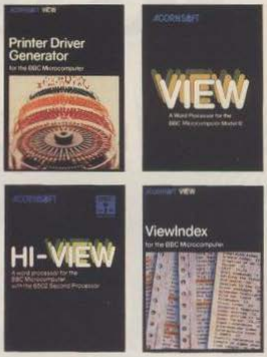
VIEW can search, change and replace particular words whenever they occur in your text. It can swap paragraphs. Automatically alter page numbers. Even count words.

The possibilities are endless, because you can check, edit and change as much or as little as you like until you're satisfied. Then, with a single command, your final version will appear on the screen.

If you want to go even further, the simple addition of ViewIndex, just £14.95, means you can select and index words, complete with page or section numbers.



And of course, when you're ready, any printer that will operate with your BBC Micro will operate with VIEW. But if you want to use the printer's special facilities, such as bold printing or underlining, Acornsoft's Printer Driver Generator (£9.95 on cassette, £11.50 on disc) enables you to do so.



For the more specialised user who wants to take advantage of the extra power offered by the 6502 Second Processor, Hi-VIEW (£59.80) provides 47K of text space in any of the BBC Micro's screen modes.

So whether you're composing a 300 page business document, a letter to the gas board, or a bit of Victorian nonsense, you can polish it to your heart's content, wasting precious little time. And even less paper.

You can get VIEW products from your Acorn dealer. Just phone 01-200 0200 for your local stockist.

Alternatively, you can send off for the View Family brochure and order through the post by contacting Acornsoft, c/o Vector Marketing, Denington Industrial Estate, Wellingborough, Northants NN8 2RL. Tel: 0933 79300.

ACORNSOFT

The text on the screen is in Mode 6.

NOT FOR PEOPLE WITH HIGH BLOOD PRESSURE!

Watch out for them—these four new games could be dangerous to your health. And, as they're from A'n'F, they're second to none, calling for a level of skill that's bound to set the adrenalin racing.

SPECTRUM 48k CYLON ATTACK—Now with better than ever isometric perspective graphics (3D). **£5.75**

BBC 32k SNARL-UP—Sheer bumper to bumper frustration and only five chances to hit the fast lane. **£6.90**

COMMODORE 64 GUMSHOE—One bleepin' obstacle after another stops you reaching a girl who needs you—desperately. **£7.90**

SPECTRUM 48k ALPHA-BETH—The brain teaser that makes it doubly difficult for you to give the right answer. **£5.75**

A&F NULLI SECUNDUS

A&F Software, Unit 8, Canal Side Industrial Estate, Woodbine Street East, Rochdale, Lancs OL16 5LB.
Telephone: 0706 341111

(continued from page 197)

definition procedure, it also enables the user to:

- Rotate the character to the right by 90 degrees.
- Flip all the character's bits to produce the "inverse" character.
- Produce a mirror image — in the vertical plane — of the current character.
- Save the defined character's data map to tape.
- Read in previously saved data maps.

Definition takes place on an eight-by-eight grid, over which the user moves a cursor using the cursor keys. Pixels of the character can be "toggled" on and off using the Copy key.

Pressing R rotates the character by 90 degrees to the right; F inverts all the bits; M produces a vertical mirror image of the character and D allows the reading in of a saved data map for further adaption. Pressing C when the character is complete produces a print out of the data map in both decimal and hexadecimal. At this point the user is given the option of saving the data map to tape, and then whether he wants to rerun the program.

Conversion of this program to run on other micros may prove to be difficult. This is due to the fact that it uses a pair of windows on the screen and also that it uses a transparent mode of character printing. Windows are a feature found on only a handful of other home micros and the "transparent" printing is — to my own knowledge — unique to the Amstrad.

A stripped-down version of this program can be produced, but it would involve redesigning the screen layout and completely changing the screen-handling routines. Also the Symbol command would have to be replaced with Pokes to define a character.

The program allows you to dump the characters you have just defined to tape as a binary file called Char.

If you want to load these into your games program, or back into the editor for further editing then follow the procedure shown in lines 70 and 75.

SYMBOL AFTER 128
LOAD "CHAR"

Although Himem will normally be the same, problems could be caused by the user attaching add-ons to the machine which will alter Himem.

In this case, if you say add a disc drive to your system and still want to use characters you defined before getting it;

SYMBOL AFTER 128:CLOW = HIMEM + 1
LOAD "CHAR", CLOW

will put the characters into the correct position in memory.

```
10 REM :::::::::::::::::::::::::::::
20 REM :::: CHARACTER DEFINER ::::
30 REM :::::::::::  BY  :::::::::::
40 REM :: J. & A. GARDINER 1984 ::
50 REM ::::::::::::::::::::::::::::
60 REM
70 SYMBOL AFTER 256:CTOP=HIMEM
75 SYMBOL AFTER 128:CLOW=HIMEM+1
80 INK 0,0 : INK 1,24 : INK 2,8 : BORDER 1
90 DIM a(8,8),r(8,8),z(8)
100 MODE 1
110 x=12 : y=4 : f1=0
120 WINDOW #1,1,40,1,15 : WINDOW #2,8,40,16,25
130 WINDOW #2,0,0,1
140 GOSUB 690
150 LOCATE 1,4
160 FOR m=1 TO 8 : PRINT TAB(10)rs : NEXT m
170 PRINT TAB(12)"12345678"
180 LOCATE 23,4 : PRINT "Character"
190 PLOT 410,324,2
200 DRAWR -28,0 : DRAWR 0,-26
210 DRAWR -28,0 : DRAWR 0,26
220 PRINT#2,"Use cursor keys to move"
230 PRINT#2,"'F' to flip all the bits"
240 PRINT#2,"'R' to rotate right 90°:CHR$(129)
250 PRINT #2,"'M' for vertical mirror image"
260 PRINT#2,"'D' to read in a saved data map"
270 PRINT#2,"'COPY' to reset point"
280 WINDOW SWAP 0,2
290 REM I : PRINT : PRINT TAB(3)"PRESS 'C' WHEN COMPL
ETE" : PEN 1
300 WINDOW SWAP 2,0
310 REM ::::::: MAIN LOOP :::::::
320 a=LOWER$(INKEY$)
330 a?=: v?=v
340 GOSUB 550
350 if a$="" THEN 320 ELSE a=ASC(a$)
360 IF a=224 THEN GOSUB 480
370 IF a$="r" THEN GOSUB 1150
380 IF a$="v" THEN GOSUB 1210
390 IF a$="m" THEN GOSUB 1520
400 IF a$="d" THEN GOSUB 1360 : GOSUB 690 : GOTO 220
410 y=y+(a=240)-(a=241)
420 x=x+(a=242)-(a=243)
430 IF x<239 AND x<244 THEN GOSUB 620
440 IF a$="c" THEN GOTO 770
450 GOSUB 690
460 GOTO 320
470 REM :::::::: RESET POINT ::::::::
480 x=x-(1 : x=x-2
490 a=z(y)+ABS(a=z(y,1))*2^(8-x)
500 f1=ABS(a=1,x)*f1
510 IF f1=1 THEN ch=ch+45 ELSE ch=32
520 LOCATE x,y
530 PRINT CHR$(ch)
540 RETURN
550 REM :::::::: PRINT CURSOR ::::::::
560 PRINT CHR$(22)+CHR$(1)      'REM  SET TRANSPARENT M
ODE
570 LOCATE x,y
580 PEN 2 : PRINT CHR$(202)
590 PEN 1
600 PRINT CHR$(22)+CHR$(0)      'REM TURN OFF TRANSPARE
NT MODE
610 RETURN
620 IF x<12 THEN x=12 ELSE IF x>29 THEN x=29
630 IF y<4 THEN y=4 ELSE IF y>11 THEN y=11
640 LOCATE x2,y2 : PEN 0
650 PRINT CHR$(32)
660 IF a=c-1:a=2-3:m=1 THEN LOCATE x2,y2 : PEN 1 : PRI
NT CHR$(143)
670 RETURN
680 REM :::::::: PLOT DEFINED CHARACTER ::::::::
690 DEF FNb(t,b)=a(t,b)+128*(z(t,b)*64+a(3,b)*32+a(4,b)
+16*a(5,b)+8*a(6,b)+4*a(7,b)+2*a(8,b))
700 FOR t=1 TO 8
710 z(t)=FNb(t,1)
720 NEXT t
730 SYMBOL 255,z(1),z(2),z(3),z(4),z(5),z(6),z(7),z(8)
740 PEN 1 : LOCATE 27,4
750 PRINT CHR$(255)
760 RETURN
770 CLS #2
780 WINDOW SWAP 1,0
790 WINDOW SWAP 0,2
800 PRINT : PRINT
810 PRINT "Character is ";CHR$(255);""
820 PRINT : PRINT "Is this correct ?"
830 a$="" : WHILE a$="" : a$=LOWER$(INKEY$) : WEND
840 IF a$="n" THEN WINDOW SWAP 2,0 : WINDOW SWAP 0,1 :
 CLS #2 : GOTO 220
850 IF a$="y" THEN MODE 1 : GOTO 870
860 GOTO 830
870 PRINT : PRINT"Data map is" : PRINT TAB(4);"dec.","h
ex"
880 PRINT
890 FOR d=1 TO 8 : PRINT TAB(5);z(d),"&";HEX$(z(d)) :
NEXT d
900 PRINT:PRINT"Do you wish to save the data map ? (y/
n)"
910 a$="" : WHILE a$="" : a$=LOWER$(INKEY$) : WEND
920 IF a$="n" THEN 1030
930 IF a$="y" THEN PRINT : INPUT"Please input a file n
ame";file$ ELSE 910
940 PRINT : PRINT"Please insert a cassette"
950 PRINT : PRINT"Press PLAY/RECORD and press any key"
960 a$="" : WHILE a$="" : a$=INKEY$ : WEND
970 file$="":"+file$ : OPENOUT file$
980 FOR m=1 TO 8
990 PRINT #9,z(m)
1000 NEXT m
1010 CLOSEOUT
1020 PRINT : PRINT"::: Data saved as ";MID$(file$,2);
" :::"
1030 PRINT:PRINT"Enter number of character to redefine
"
1040 PRINT:PRINT"(ASCII code 128-254)."
1050 PRINT : PRINT "Enter 0 if no definition required.
";: INPUT num
1060 IF (num<128 OR num>254) AND num<>0) THEN 1030
1070 IF num=0 THEN 1100
1080 SYMBOL num,z(1),z(2),z(3),z(4),z(5),z(6),z(7),z(8)
1090 PRINT:PRINT"Character"num"is now ";CHR$(num);"
"
1095 GOSUB 3000
1100 PRINT : PRINT"Do you wish to run again ? (y/n)"
1110 a$="" : WHILE a$="" : a$=LOWER$(INKEY$) : WEND
1120 IF a$="y" THEN RUN 80
1130 MODE 1 : END
1140 REM :::::::: FLIP ROUTINE ::::::::
1150 FOR j=1 TO 8
1160 FOR k=1 TO 8
1170 a(j,k)=ABS(NOT(a(j,k)))
1180 NEXT k,j
1190 GOSUB 1290
1200 RETURN
1210 REM :::::::: ROTATE ::::::::
1220 FOR p=1 TO 8
1230 FOR q=1 TO 8
1240 r(9-q,p)=a(p,q)
1250 NEXT q,p
1260 FOR p=1 TO 8 : FOR q=1 TO 8
1270 a(p,q)=r(p,q)
1280 NEXT q,p
1290 FOR j=1 TO 8
1300 FOR k=1 TO 8
1310 LOCATE 31+j,3+k
1320 IF a(j,k)=1 THEN PRINT CHR$(143) ELSE PRINT CHR$(
32)
1330 NEXT k,j
1340 RETURN
1350 REM :::::::: READ IN DATA ::::::::
1360 WINDOW SWAP 0,2 : CLS : PRINT : PRINT
1370 OPENIN "
1380 FOR m=1 TO 8
1390 INPUT #9,z(m)
1400 NEXT m
1410 CLOSEIN
1420 WINDOW SWAP 2,0
1430 FOR j=1 TO 8
1440 sq$=BIN$(z(j),8)
1450 FOR k=1 TO 8
1460 a(j,k)=VAL(MID$(sq$,k,1))
1470 NEXT k,j
1480 GOSUB 1290
1490 CLS #2
1500 RETURN
1510 REM :::::::: MIRROR IMAGE ::::::::
1520 FOR j=1 TO 4
1530 FOR k=1 TO 8
1540 r(j,k)=a(j,k)
1550 NEXT k,j
1560 inc=1
1570 FOR j=5 TO 8
1580 FOR k=1 TO 8
1590 a(inc,k)=a(j,k)
1600 a(j,k)=a(inc,k)
1610 NEXT k
1620 inc=inc+2
1630 NEXT j
1640 GOSUB 1290
1650 RETURN
2000 PRINT"Do you wish to save the character set ? (y/
n)"
2010 a$="" : WHILE a$="" : a$=LOWER$(INKEY$) : WEND
2020 IF a$="y" THEN RETURN
2030 SAVE"CHAR",B,CLOW,CTOP-CLOW
2040 PRINT"Saved as file 'CHAR'"
2050 RETURN
```

Autopause

Ian Cash

ORIC

A USEFUL FEATURE on many games is a pause control, allowing the player to take a breather from zapping all those aliens. However, not all games have this ability, and this is where my program helps.

It was written on a 48K model, but should work with any Oric using the V1.0 operating system and should not be too difficult to convert for other Orics. As the program relies on interrupts it will not work with games which do not use them — but this is a minority I'm sure. The only other drawback is a small delay in keyboard response when typing in direct mode, but this does not apply to games I'm sure it will not be noticed.

Any key may be used as the pause control — including Ctrl and Shift keys — by simply changing line 60 according to table 1. The game will pause as long as this key is pressed and continue on release.

After typing in the program and checking carefully, Run it, and then Cload the game. The routine can be disabled by

POKE # 230, 64

Table 1. For Ctrl,LShift and RShift, the first number on line 60 should be changed to # 09.

The last number should be chosen from the list of keyboard values to replace the 130 for whichever key you wish to use as the pause control.

Naturally this should not be a key already used in the program.

Table 1 continued

```
5 REM Oric Autopause by I.Cash
10 FORA=#231TO#24B:READ D:POKEA,D:NEXTA
20 FORA=#276TO#28B:READ D:POKEA,D:NEXTA
30 POKE#230,234  enable:Poke #230,64 to stop.
40 DATA #0E,#42,#02,#BA
50 DATA #EB,#EB,#48,#AD
60 DATA #0B,#02,#C9,130  'See text
70 DATA #D0,#5E,#4C,#7A
80 DATA #02,#FF,#FF,#FF
90 DATA #FF,#42,#46,#02
100 DATA #AD,#43,#02,#F0
110 DATA #35,#BD,#00,#01
120 DATA #BD,#44,#02,#A9
130 DATA #46,#9D,#00,#01
140 DATA #EB,#BD,#00,#01
150 DATA #BD,#45,#02,#A9
160 DATA #02,#9D,#00,#01
170 DATA #A9,#00,#BD,#43
180 DATA #02,#F0,#17,#AD
190 DATA #43,#02,#D0,#12
200 DATA #AD,#44,#02,#9D
210 DATA #00,#01,#EB,#AD
220 DATA #45,#02,#9D,#00
230 DATA #01,#A9,#FF,#8D
240 DATA #43,#02,#AE,#42
250 DATA #02,#68,#40
```

The Unsurpassable Experience.

synsoft

The Official

ZAXXON

SEGA

Now you can play one of the most challenging arcade games on your Commodore 64 home computer. ZAXXON's incredible 3-D graphics, diagonally scrolling screen and supersound are reproduced in great detail. Everything you love about the arcade game is here – and much more. ZAXXON is now more difficult than ever before! So hang onto your joystick and keep firing. Then practice. You may eventually encounter the deadly ZAXXON himself.

U.S. GOLD At American Software

synsoft

commodore 64

THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:

Boots John Menzies WHSMITH WILDINGS WOOLWORTH

CASSETTE £9.95

DISK £14.95

U.S. Gold Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH Telephone: 021-520 7591. Telex: 337268.

PSION ORGANISER competition RESULTS

THREE PSION ORGANISERS plus a choice of software were up for grabs in our September competition. To enter you needed to place eight of the machine's features in order of importance. As a tiebreaker we wanted you to suggest an original use for the database facility.

As usual our panel of judges made heavy weather of the business of picking the winning list. All agreed that the crucial features of the Organiser were its portability and data storage capacity: on the other features there was fierce disagreement.

"Speedy data access" was a particularly tricky one. It is obviously a vital feature, but can't it be taken for granted? Surely this is what computers are supposed to be good at. And what about "rugged construction"? For most applications the device would not have to be very robust. But perhaps Psion should consider bringing out a range of outdoor models — the Safari Organiser or an underwater version.

The panel's final choice was the following one:

1. Pocket-sized.
2. Permanent data storage.
3. Battery powered.
4. Re-usable datapacks.
5. Speedy data access.
6. Software library.
7. Own program language.
8. Rugged construction.

The three entries which matched or came closest to this list were from: Matthew Langham, Dhauner STR. 184, 6570 Kirn, West Germany; R Shaw, 3, Heathfield Cottage, Lodge Lane, Nailsea, Avon; M Gottlieb, 22 Gibbs Green, Edgware, Middlesex.

M Gottlieb's database suggestion — for storing lecture notes — was a little dull. M Shaw was more original with a plan for keeping records of 100 cows.

We were not sure whether Matthew Langham was joking when he wrote: "I would store some Pretty Special information on Natterjacks in my Organiser". A natterjack, if you are wondering, is a small toad which runs instead of hopping.

Other database ideas ranged from the humourous to the highly practical. Dutch schoolboy Nouter Falk thought he would use the datapacks to cheat in exams, passing the machine off as a calculator. Good thinking, Nouter, you will be out of there in no time.

But watch out for schoolmaster J Davenport whose idea is to use the Organiser for "filling subjectively observed day to day behaviour characteristics of pupils at the moment of observation".

Daniel Langton refused to give anything away. "Private and confidential" he wrote coyly. Come off it Mr Langton, stamp collections are out in the open these days. Unless of course you are thinking along the same lines as D Oliver who suggested "Red-hot phone numbers".

On the practical level, anti-tank helicopter pilot Captain Husband thought to store daily changing battlefield codes and grid references, while fireman D Dempster argued the need for a computerised A to Z index. Even more sensible was P Metherall's idea of entering milk delivery details for his milk round.

Lastly, Russell Cooper seems to be in some confusion with his notion of using the Organiser to compose music.

Make things happen with Memoco.

Memoco Electron Robotic Arm

12 Axis of movement. Arm raise and lower. 360 degree rotation left or right. 90 degree Elbow movement left or right. 90 degree wrist movement either side of centre. 360 degree wrist rotation in either direction. Claw open and close.
Fitted with motor control circuit. Switched from 5 volt TTL. Controlled by computer. Separate motor driver power supply.

Digital Version ____ £89.95
With position feedback ____ £119.95

BBC B Interface card ____ £49.00
Spectrum interface card ____ £49.00
Commodore 64 interface card £49.00

200 in 1 Electronic Lab Kit.
An ideal Introduction To Electronics.
Includes all parts to make 200 projects. Such as Radio: Rain Detector. Burglar Alarm. Covers projects using Transistors: Integrated Circuits: Seven Segment Displays Light Sensitive Circuits and many more.
All components built into fitted workcase. With cover. Comprehensive Manual. Completely safe.
Normal Price £34.00
Our price ____ £24.95

Range Doubler Multitester. 43 Ranges.
50,000 Ohms per Volt DC. 10,000 Ohms per Volt AC. 4.25" Colour coded mirrored display. Giving accurate reading without parellex error.
Normal Price £27.00
Our Price ____ £15.45

Computer Compatible Tape Recorders

Commodore 64 and Vic 20	£28.75	Acorn Electron	£30.00
BBC B	£22.95	ZX81 and Spectrum	£22.95

ALL ABOVE DEVICES SUPPLIED WITH LEADS

MEMOCO ELECTRON

VISA Access

15 WINDSOR STREET,
MELTON MOWBRAY, LEICS.
TELEPHONE: (0664) 63544

HERE'S SIX WAYS T

PAINTBOX

Superb Graphics — without expensive hardware!

PAINTBOX is a must for every owner of a 48K Spectrum.

It will give you the ability to produce stunning graphics on your micro — simply.

With PAINTBOX there's no need for expensive hardware — why pay up to £150 for hardware when you can produce incredible picture and graphics with one cassette-based software package?

If you haven't seen PAINTBOX demonstrated you're in for a pleasant surprise!

For instance, PAINTBOX will enable you to draw practically anything on your screen and save it either as SCREEN$ or as a machine code memory file to use in your BASIC or MC programs.

You wield enormous power over the graphics capability of your SPECTRUM — including the definition, storage and use of up to 84 UDG's — 4 times more than normal! A brief description of facilities are as follows:

UDG DRAWING BOARD for defining up to 4 Banks of UDG's including ROTATE, MIRROR, INVERSE etc.

UDG EDITOR for storing up to 84 UDG's for use in screen planning or in your other programs.

PRECISION PLOTTER. A high-resolution drawing board which allows you to draw anything on the screen. Facilities like CIRCLE, FILL, ARC, PLOT, DRAW, ERASE, OVER, DRAW RADIALLY, INK, BRIGHT etc are included and easy to use!

SCREEN PLANNER gives you the best of both worlds! The combined use of PRECISION PLOTTER and your Banks of UDG's for highly detailed and precise screen graphics.

The program is complete with DEMO on side two of the cassette and a 28 page instruction booklet.

PAINTBOX can be used with Joysticks and is Sinclair Microdrive compatible.

SCREEN MACHINE

Instant Machine Code for graphics and text

SCREEN MACHINE is a completely professional graphics utility to use with Paintbox (or any other graphics hardware or software).

It will allow you to manipulate your screen graphics and text in ways which will make your programs better and more memory efficient. For instance:

If you have produced a screen-full of superb graphics you can enlarge, reduce, recolour, flip screen, relocate your graphics to another part of the screen, superimpose one screen on another and perform all sorts of other wonders!

Then you can take your results and put them through a series of memory compression routines to allow you to save enormous amounts of memory. Such items like compressing with or without attributes, saving thirds of the screen and multiple combinations of both are possible.

Never has machine code storage of graphics been simpler because SCREEN MACHINE automatically creates re-callable multiple screen files with a location catalogue so that you can add them to your programs!

SCREEN MACHINE also allows the user to program UDG's or text directly into machine code, so if your programs use a lot of text instructions or menus SCREEN MACHINE is going to save fantastic amounts of memory!

SCREEN MACHINE is a major graphics toolkit for the 48K SPECTRUM. It is completely menu-driven, Sinclair Microdrive compatible, and comes with instruction book and an unbelievable DEMO on side 2 of the cassette.

ADVENTURE PLANNER

A must for the adventure game fan

If you're an Adventure Game nut, Print 'n' Plotter's new ADVENTURE PLANNER is exactly what you have been looking for!

It's a 50 page, BIG SIZE (16¾" x 11¾") pad with a complete 'mapping' system with over 150 locations on each sheet . . . created to help you solve Adventure Games.

It's the best way to beat the 'system' and is obviously for use with any make of computer.

ADVENTURE PLANNER will also assist you in planning Adventure Games for programming — a helpful pad to keep by your computer at all times.

IMPROVE PROGRAMS.

ADVENTURE PLANNER is published with instructions for use, examples, hints and tips on how to play and win the game faster.

ADVENTURE PLANNER is a high quality pad, board-backed and fly-leaf cover . . . economically priced too!

ZX SPECTRUM JOTTER

Pre-planning your screen made easy . . . and precise!

Print 'n' Plotter JOTTERS have become a household word for the Sinclair enthusiast.

Despite various imitations our original ZX SPECTRUM JOTTER is still the one people prefer!

Of course it could be because it is professionally produced . . . the quality is superb.

And the fact that it is BIG SIZE A3 (16½" x 11¾") is a distinct advantage when working in high-resolution.

It's also 100 pages thick. 50 pages of PLOT grids showing each numbered pixel co-ordinate and 50 pages of PRINT grids showing every character and graphic character position and INPUT lines.

Each page also contains 24 UDG planning grids (2400 per pad).

Consider also the fact that it is printed on Artist's Detail paper . . . thick enough to take any writing, drawing or colouring, yet thin enough to overlay onto a drawing and trace-off.

For pre-planning graphics, text, tabulation or anything to produce 'on screen', a Print 'n' Plotter JOTTER won't be beaten.

The complete package comes with a set of coloured pens, a Pixel ruler and a handy corrugated storage tray.

If you use PAINTBOX, SCREEN MACHINE or any other graphics utility . . . you'll do things better with the ORIGINAL Print 'n' Plotter JOTTER!

KEYBOARD OVERLAYS

The simple answer to "Which key?"

Print 'n' Plotter KEYBOARD OVERLAYS for the standard ZX Spectrum keyboard are the economic answer to "Which key does what?"

If you program, or buy commercially-produced software, sooner or later you'll be faced with a mind-boggling mass of keys that perform different functions.

Let's face it, the Spectrum keyboard is complicated enough so why not take the easy way to remember . . .

. . . lay over the keyboard a Print 'n' Plotter OVERLAY and write the function underneath . . . it's child's play!

Print 'n' Plotter KEYBOARD OVERLAYS come in packs of ten. Punched to fit your Spectrum. Priced to suit your pocket!

ZX PRINTER PAPER

High quality. Cheaper Price!

Print 'n' Plotter have gained a good reputation for the most reliable and high quality PRINTER PAPER for your ZX PRINTER.

Now it's even better because we've reduced the price!

So if you want ZX PRINTER PAPER that gives good, clear print . . . and you want it a little cheaper . . . send today for quick delivery!

ORDER NOW OR ASK YOUR LOCAL COMPUTER SHOP!

CREDIT CARD
24hr ANSAPHONE ORDERS
01-660 7231

(Phone 01-403 6644 for Dealer and other enquiries)

Post to: Dept Y10 Print 'n' Plotter Products Ltd 19 Borough High Street, London SE1 9SE Please send me the following:

.....	PAINTBOX SOFTWARE	@ £ 8.25
.....	SCREEN MACHINE	@ £ 8.25
.....	ADVENTURE PLANNER	@ £ 4.50
.....	SPECTRUM JOTTER PADS	@ £ 9.00
.....	KEYBOARD OVERLAYS	@ £ 2.95
.....	5 ROLLS ZX PRINTER PAPER	@ £12.00
.....	10 ROLLS ZX PRINTER PAPER	@ £23.00

☐ Please tick this box for Paintbox Microdrive instructions

All prices include VAT and U.K. postage

Overseas orders add 25% on quoted prices for additional handling

☐ I enclose remittance in full

☐ Please bill my ACCESS/BARCLAYCARD/VISA/MASTERCARD No:

Name: _____

Address: _____

Print 'n' Plotter Products

Y10

DOWNSWAY

Operates with Turbo-Loaded Programs

NEW!

CBM 64 / VIC 20 CASSETTE INTERFACE

THE ULTIMATE in computer hardware

SPECTRUM PROGRAMMABLE JOYSTICK INTERFACE

NEW!

ORIC 1/ATMOS PROGRAMMABLE JOYSTICK INTERFACE

COMMODORE 64 CENTRONICS PRINTER INTERFACE

NEW!

VIC 20 16K SWITCHABLE CARTRIDGE

VIC 20
SPECTRUM
ORIC1/ATMOS
COMMODORE 64

For full details and FREE 'Can of Worms' poster, send a large S.A.E. to:
DOWNSWAY ELECTRONICS (U.K.) LTD., Depot Road, Epsom, Surrey KT17 4RJ
Tel: Epsom (03727) 27222. Tlx: 877837 Merit G. Access/Visa cards welcome.

MW MW

THE MICRO WORKSHOP

MICRO COMPUTER SPECIALISTS

(Spectrum Group Member)

Software and hardware over the counter for Sinclair Spectrum, ZX-81, BBC,. Vic-20, CBM-64, Memotech, Amstrad, etc.

* COMPUTERS
* RAMPACKS
* JOYSTICKS
* BOOKS
* KEYBOARDS
* DISCS
* TAPES
* LIGHT PENS

* COMPONENTS *

Business/Serious Programs available

Located directly opposite Epsom Main Line Station. Visit us or ring for friendly service. See and try before you buy.

Overseas/Export orders welcome

12 STATION APPROACH
EPSOM, SURREY.
EPSOM 21533

THOUGHTS & CROSSES

37 MARKET STREET, HECKMONDWIKE, WEST YORKS.
Telephone 0924-402337

ALL PRICES INCLUDE VAT AND DELIVERY

COMPUTERS

BBC B.....£399
(Free software £50 + Free)
BBC B with DFS.....£469
Electron.....£169
Spectrum 48K.....£125
(Free software worth £57)
Memotech 512.....£275
Commodore 64.....£189
Oric 1 48K.....£89
Limited number available.
Apple IIe with Disk
Drives 2 & Controller.....£985

PRINTERS

Canon PW1080A NLQ.....£305
Canon PW1080A NLQ
+ GL RS232 Interface.....£350
Canon PW1156A NLQ.....£380
Canon PJ1080A (colour).....£399
Canon RS232 Interface.....£80
Epson RX80.....£269
Epson RX80FT.....£289
Epson FX80.....£389
Epson FX100.....£520
Epson DX100.....£475
Brother HR5.....£165
Brother EP55.....£235
Juki 6100.....£375
NEC PC8023.....£210
Shinwa CP80.....£199
Shinwa RS232 + 2K buffer.....£54
Commodore 1520 plotter.....£95
Commodore MPS801.....£210
Alphacom 32.....£59
MCP 40.....£119
Riteman - A1.....£249
Riteman RS232 Interface.....£39
Epson RS232 Interface.....£29
Epson RS232 with 2K buffer£65

DISK DRIVES

Sinclair Microdrive.....£45
Sinclair Interface 1.....£45

Pace or Cumana

All with separate PS
100K S/S 40T.....£149
200K D/S 40T.....£173
400K D/S 40T.....£215

Double Drives

200K S/S 40T.....£295
400K D/S 40T.....£329
800K D/S 80T.....£417
800K D/S 40/80T.....£478
3" 200K D/S.....£125
Commodore 1542/10
Torch Disk Pack
with free software.....£800
Memotech Single
inc free software.....£410
Memotech Double
inc free software.....£800
6502 2nd processor.....£195
Z80 2nd processor
inc free software.....£295

Wabash or 3M Disks

5¼" or 8"
S/S S/D 40 track.....£17
D/S S/D 40 track.....£20
D/S D/D 40 track.....£22
D/S D/D 80 track.....£28
3" Maxwell.....£4.50
3½" Hewlett Packard.....£4.50
Further discounts for quantity.
50 + 10% discount.
100 + 15% discount.

MONITORS

Microvitec 1431MS (std).....£199
Microvitec 1451MS (med).....£290
Microvitec 2031 20".....£299
Microvitec 1451MZ.....£245
Microvitec QL (med).....£275
Philips 12"200 Green
Antiglare.....£70
Commodore 1701.....£210
Fidelity.....£210

CASSETTE RECORDERS

Commodore C2N.....£40
Ferguson.....£27.50
Berkson.....£25
Bell & Howell 3179CX.....£39
Panasonic.....£30

JOYSTICKS & INTERFACES

Quickshot II.....£11
Sure Shot.....£15
Stak: BBC Dragon,
Spectrum or Commodore
Pro Ace.....£9
Zip Stick.....£12
Kempston 5000.....£11.50
Cambridge Joystick.....£29
+ Interface and program
Kempston Interface.....£11.50
DK Tronics Programmable.....£22
DK Tronics Dual Port.....£12
Shum Shot Interface.....£20
First Byte Interface.....£24

DESKS

Opus Model 1.....£110
Opus Model 2.....£130
Opus Model 3.....£130
Opus Model 4.....£110
Opus Model 5.....£150
Opus Model 10.....£200

BBC

Electron Plus 1.....£60
The Key (disk).....£11.50
Replica 2 (disk).....£10.50
Replica 2 (3" disk).....£13
Grafkey.....£8
Grafdisk.....£11.50
Beta-Base (disk).....£22
Beta-Base (3" disk).....£22
Wordwise.....£40
Disk Doctor.....£30
Gremlin.....£30
Caretaker.....£32
B.C.P.L.....£95
Acorn Speech Rom.....£54
View.....£65

P.V.C. COVERS

BBC.....£3.99
Microvitec 14".....£4.90
Acorn Electron.....£2.99
BBC Cassette Rec.....£2.90
Spectrum.....£1.99
VIC 20/64.....£2.99
Epson FX80.....£4.90
Epson RX80.....£4.30
Apple.....£4.50
Apple + Monitor.....£5.75
Seikosha 80.....£3.50
Seikosha 100.....£3.75
Over 40 different covers
available. Phone for
availability and price.
BBC B Hard cover (plastic)£9.90

RIBBONS

Epson MX/FX/RX80.....£6
Epson MX/FX100.....£15
Seikosha GP.....£4.50

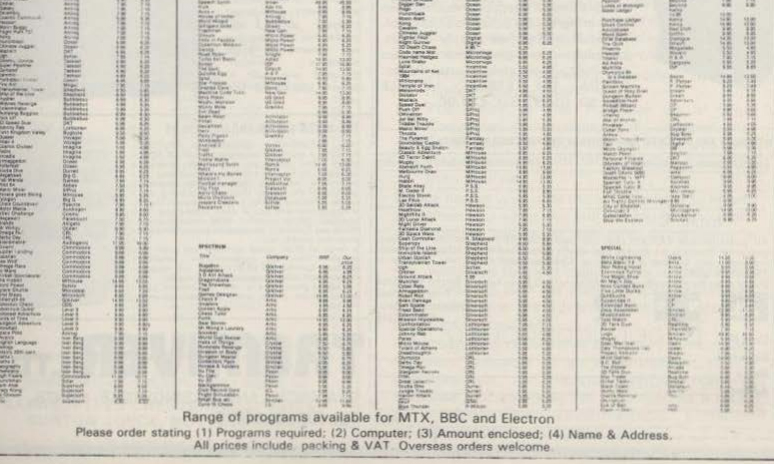
Micropaw.....£2.30
Anglepro - E12 10MPS801.....£6.50
NEC 8023.....£7
Canon PW1080.....£11
Canon PW1156.....£11
Epson 100 Refill.....£3.30

LEADS

BBC to Parallel Printer.....£10
BBC to Serial Printer.....£10
RS423 5pin DIN to 9pin DIN
£4.50
RS232 'D' to 'D'.....£13.50
Memotech Printer Lead.....£10
Dragon to Parallel Printer£13.50
Codmodore to Parallel Printer
£13.50
Oric to Parallel Printer.....£13.50
Pet to Parallel Printer.....£13.50
Atari to Parallel Printer.....£13.50
BBC to Single Disk Drive.....£13
BBC to Dual Disk Drive £16
BBC Single Power.....£5
BBC Dual Power.....£5.50
7pin DIN to DIN & jack.....£2.40
7pin DIN to 3 jacks.....£2.40
5pin DIN to 5pin DIN & jack
£2.40
5pin DIN to 3 jacks.....£2.40
Sinclair 48K cassette lead£1.80
RGB monitor (6pin DIN).....£3.20
The Plug suppressor
and RFI filter.....£16
Spectrum onoff switch.....£3.99

SPECTRUM

Spectrum Amplifier.....£10
Light Pen.....£18
Keyboard.....£45



Range of programs available for MTX, BBC and Electron

Please order stating (1) Programs required: (2) Computer; (3) Amount enclosed; (4) Name & Address.
All prices include packing & VAT. Overseas orders welcome.

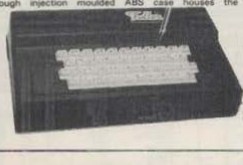
ADD ONS ADD ONS

ZX81 SPECTRUM

The Fuller FDS. Now better than ever! All the features you'll ever need from a Spectrum keyboard all in one smart, durable unit. Space bar, cursor control keys, single key delete, caps shift, symbol shift, F1 mode, separate full stop and comma keys, beautifully made, handsome to look at and a delight to use. **£49.95** plus £2.00 p.p.

PROFESSIONAL CASED KEYBOARD TYPE FD42.
Models for the ZX81 and SPECTRUM
(PLEASE STATE WHICH)

The Fuller FD42 has long been our most popular seller. Its sturdy, attractive but very tough injection moulded ABS case houses the computer and converts it into a professional unit with 42 full size long-life computer-style full-travel keys. Keys are indelibly etched with ZX81 or Spectrum legends. No skills or soldering needed and full access is maintained to the user ports etc for add-ons. Power supply can be fitted inside. Has integral LED for power ON/OFF indication. In all a thoroughly worthwhile accessory to your computer. **£29.95** plus £2.00 postage and handling.



The famous Panda Expandable RAM pack for the ZX81. Massive 16K add-on memory which can easily be expanded to a GIANT 32K with an optional plug-in MODULE. Rugged no-wobble design injection moulded case with integral LED power on indicator. No additional power supply needed, just plug on and go. British designed and built. Thousands in use. Prices: PANDA 16K **£19.95.** MODULE **£14.50.** GIANT 32K **£34.00.**

PRODUCTS ARE STOCKED AND USUALLY DESPATCHED WITHIN 10 DAYS.

I wish to order the following: *(Please state which computer)*

TOTAL £

All prices include VAT and post and packaging. All items include a full year guarantee. Products are stocked and usually despatched within 10 days. Overseas customers add £4 post and packing. Cheques/Postal Order, etc., payable to TREMIVER LTD.

Please debit my Access/Barclaycard/Diners Club Int/as below

Round the clock 7 days a week Telephone orders. 0256 66116

Card No. □□□□□□□□□□□□□□□□

Signature

Name

Address

YC6

SPECTRUM UPGRADES 16K to 48K

THE KIT — Fit it yourself, a beautifully packed and presented kit with complete (Really complete in the detail you need if you've never seen inside your computer) instructions. No soldering — no wire bending — no fiddly bits. Thousands in use. Everything you need to upgrade your issue 2 Spectrum from 16K to a full blown 48K. The really economical upgrade — in stock for swift despatch. **£24.00**

THE PACK — A sturdily packages 16K to 48K upgrade pack that simply plugs on to the user port and works immediately. Throughport so any other accessories may be fitted as before. No need to open the case, no unscrewing, no soldering, no need to invalidate your guarantee. Designed and built in Britain. Guaranteed. Supplied in handsome carton suitable for gift wrapping. **£39.95**

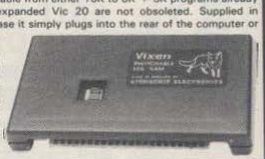
NEW!! Upgrade your ISSUE 3 Spectrum from 16K-48K. This kit is supplied with full parts and very comprehensive instructions as to how to upgrade your ISSUE 3. Due to the change in design of the issue 3 this has not been possible with previously available kits. Not for the complete amateur as it requires two simple soldered connections to be made, anyone who has soldered before or who has a friend can fit this quite easily though. **£26.50**

VIC 20

THE VIXEN SWITCHABLE RAM £34.95

16K RAM CARTRIDGE

The Vixen 16K switchable Ram cartridge is unique approach to expanding your VIC 20. Being switchable from either 16K to 8K + 3K programs already in use based on the unexpanded Vic 20 are not obsoleted. Supplied in attractive custom made case it simply plugs into the rear of the computer or motherboard. No additional power needed. High quality gold plated contacts ensure long trouble free life. Switches are recessed to avoid accidental operation. Designed and built in Britain. Guaranteed one year.



THE VIXEN MOTHERBOARD £31.95

THE EXPANDABLE EXPANSION SYSTEM. Providing 4 additional cartridge slots PLUS ROM socket. The slots are switchable enabling cartridges to be left in place and selected as needed by switching thus avoiding constant handling nd the danger of breakage. Having one socket at the rear enables further expansion. Used in conjunction with one or more Vixen Rams full expansion can be achieved. ROM socket enables ROMs and Eproms to be fitted for future software programs, toolkits etc.

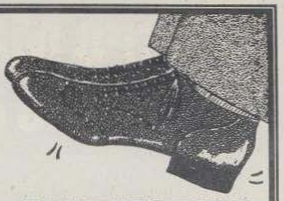
A range of ROM based software will soon be available from the manufacturers. Industry standard Eproms, 2716,2732 etc are readily available and easily programmed and copied.

A sound investment for the serious user and serious games player which will not become obsolete.

TREMIVER LTD.

93A PACK LANE, BASINGSTOKE, HANTS.
Tel. (0256) 66116

PRICES THAT'LL KNOCK YOU OFF YOUR FEET!



DAISY WHEELS

Alphacom 32 Printer	£59.99
Brother HR15	£325.00
Brother HR25	£555.00
Brother HR35	£699.00
Daisy Step 2000 (20CPS)	£225.00
Diablo 630 (API)	£1310.00
EF 44 Personal Elec. Printer	£195.00
Juki 6100	£315.00
Quen-Data Daisy Wheel Printer	£225.00
Qume 11/40 (RD)	£1175.00
Qume 9/45 (RD)	£1535.00
Qume Letter Pro 20	£750
Richo RP1300	£875.00
Richo RP1600	£1175.00
Smith Corona TP1 Daisy Wheel Printer	£175.00

PERIPHERALS

Commodore 1701 Colour Monitor	£175.00
Sanyo 2112 Green Screen 15MHZ	£65.00
Sanyo 3125 Col. Med. Ress. 400PIS	£175.00
Sanyo 3115 Col. V Hi Ress. 800PI	£399.00
Commodore 1541 Disk Drive	£156.52
Oric Disk Drives	£229.00
Sinclair Microdrives	£50.00
Keyboard	£130.00
Sinclair Interface "1"	£50.00
Commodore C2N Cassette	£35.00
All leading software names available	P.O.A.
Tailormade software written by our inhouse software team	P.O.A.

Keyboards, cable, interfaces, tractor feeds, sheet feeds, disks, software, up grades, listing paper, ribbons, daisy wheels available for most products.

* Guarantees available
* Wholesale prices!
* Export facilities arranged
* Superb stock of computers and peripherals
* Express delivery

RING 01-947 8562

Official suppliers to the U.K. government departments, British Telecom and many multi-national organisations.

COMPUTERS

Apricot 256K 2x315 D/D + Monitor	£1399.00
Apricot 256K 2x730 D/D + Monitor	£1549.00
Apricot 256K 10MB HD.D + Monitor	£2225.00
BBC Model B	£320.00
Commodore 64	£152.18
Commodore VIC20 Starter pack	£108.69
Commodore SX 64 (Portable)	£509.00
Commodore 8000 Systems Series	£1200.00
Epson QX10 + RX80 + cable	£1599.00
Epson Portable PX	£649.00
Epson Portable PX + RAM	£799.00
Oric Atmos 48K	£145.00
Sanyo MBC555 2x160K D/D + Monitor	£899.00
Sinclair Spectrum 48K	£100.00
Sirius 1 128K 1.2MB	£1650.00
Sirius 1 256K 1.2 + 10.6MB	£2950.00
Televideo	P.O.A.

IBM: Telephone for a quotation on your configurations.

All prices excluding V.A.T.

DOT MATRIX

Admate 80	£175.00
Anadex DP 9000	£799.00
Brother HR5	£130.00
Canon PW1080A (NLQ)	£275.00
Commodore MTS 801	£175.00
Epson RX80T	£190.00
Epson RX80 F/T	£215.00
Epson FX80	£320.00
Epson RX100 F/T Printer	£325.00
Epson FX100 F/T	£425.00
Mannesmann Tally MT80	£199.00
Mannesmann Tally MT160	£449.00
Mannesmann Tally MT180	£580.00
MP165 (NLQ)	£275.00
OKI Microline 82A Printer	£249.00
OKI Microline 83A	£389.00
OKI Microline 92 (P)	£365.00
OKI Microline 84 (P)	£629.00
Radix 10 (NLQ)	£445.00
Seikosha GP100A	£179.00
Seikosha GP100VC	£175.00
Shinwa CP80 F/T Para	£169.00
Star Gemini 10X	£189.00
Star Delta 10	£319.00
TEC 1550 (P)	£459.00

WORLDWIDE COMPUTERS LTD

Spa House, 11-17 Worple Road, Wimbledon, London SW19 4JS Tel: 01-947 8562 Telex: WOWICO 8955888

SOFTWARE
FOR YOUR
MICRO
HUGE SAVINGS ON POPULAR GAMES

SPECTRUM 48K

LORDS OF MIDNIGHT	4.75
AQUARIUS	4.75
SPECTRES	4.75
CAVENFIGHTER	4.75
MANIC MINER	4.75
BIRDS AND THE BEES	4.75
ARCTURUS	4.75
THE TRAIN GAME	4.75
WHEELIE	4.75
LES FLICS	4.75
1994	4.75
MOON BUGGY	4.75
SHEER PANIC	4.75
STAR WARRIOR	4.75
FIREBIRDS	4.75
REPULSAR	4.75
MEGAPEDE	4.75
OSTRON	4.75
ROBON	4.75
MONSTERS IN HELL	4.75
MICROBOT	4.75
POTTY PLANTER	4.75
CRASH WARRIOR	4.75
MUSHROOM ALLEY	4.75
PENGY	4.75

COMMODORE 64

MANIC MINER	5.50
BOZOS NIGHT OUT	5.50
CRAZY BALLOONS	5.50
DINKY DDO	5.50
ARCADIA	5.50
STAR COMMANDO	5.50
SUPER GRIDDER	5.50
TALES OF ARABIAN NIGHT	5.50
HOUSE OF USER	5.50
SUPER SKRAMBLE	5.50
PLUMB CRAZY	5.50
UGH	5.50
ZOIDS	5.50
SCUBA DIVE	5.50
BANANA DRAMA	5.50

VIC 20

PINBALL WIZARD	4.95
GRIDDER	4.95
ASTEROIDS	4.95
WACKY WAITERS	4.95
ARCADIA	4.95
PANIC	4.95

Orders £12 or over P&P free. Orders under £12 P&P £0.20.

Please make cheques or postal orders payable to:

SARASOFT, 29 CHESTERFIELD DRIVE, BURTON JOYCE, NOTTINGHAM.

Further titles available, send S.A.E. for details

MAIL ORDER PROTECTION SCHEME

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Your Computer* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided that:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of of *Your Computer* summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claims and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent.

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements. Classified advertisements are excluded.

Micro Markets – Specialists in the new MSX System

MSX represents one of the most important advances in micro computing technology by introducing a compatible standard to micro computers. And Micro Markets, at the forefront of this new technology are pleased to be able to offer computers, peripherals and a full range of software for the new MSX Systems. MSX will offer the user a compatible programming language and therefore compatible software for all the MSX computers in the form of cassette, cartridge and disk. Visit your nearest Micro Market store soon.

Toshiba HX-10 Computer including starter Pack Software £279.95

A powerful home computer designed to satisfy the first time user, enthusiast and businessman alike. Featuring MSX Basic operating language, a powerful 64K memory and 73 Key fullstroke keyboard, the HX-10 will produce high resolution graphics including graphs and charts in up to 16 colours and full 8 octave music generation. The HX-10 is totally expandable and like the software, MSX hardware is also standardised enabling users to add a wide range of peripherals. Comes complete with starter pack of software.

Toshiba KT-22 Data Recorder £29.95

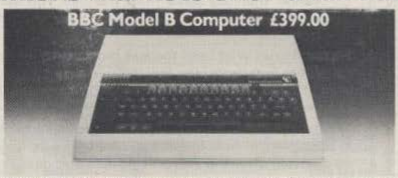
For the storage and playback of data on your MSX computer this compact, quality unit from Toshiba is ideal. With top-mounted controls tape counter and sound level sensor which stops the tape when there is no sound.

A selection from our extensive range of MSX software

Coco in the Castle	£6.95	Les Flics	£7.9
Driller Tanks	£8.95	Hustler	£6.9
Binary Land	£8.95	Fuse Wars	£4.9
Fire Rescue	£7.95	Devil Diver	£4.9
Eric the Floaters	£5.95	Maziacs	£4.9
Dog Fighter	£6.95	Footloose	£4.9
Holdfast	£5.95	Peter Plumber	£4.9
Spooks and Ladders	£6.95	Popeye	£4.9
Hyper Viper	£7.95	Ant Attack	£7.9
Zen Machine Code Prog System	£19.95	Boogaboo	£7.9
WDPRO Word Processor	£29.95	Fred	£7.9
Database	£19.95	Snowman	£7.9
Starting with the MSX	£5.95	Games Designer	£9.9
The MSX Red Book	£8.95	French	£7.9
Maxima	£7.95	German	£7.9
Champ Assembler Monitor Package	£9.95	Spanish	£7.9
Time Bandits	£7.95	Buzz-Off	£7.9
		Hot Shoe	£5.9
		Oh Mummy	£5.9
		Blagger	£7.9

Micro Markets offer a full range of leading brand computers

BBC Model B Computer £399.00



Accepted as the standard in schools and colleges for learning computing. The BBC Model B features the powerful BBC Basic programming language, 32K memory, 73 key full stroke keyboard, 16 colour high resolution graphics and sound synthesizer. It has several interface parts for easy connection to many peripherals and there is a large range of business, home and games software available.

Acorn Electron Computer £199.95

Built by the same company as the BBC computer and therefore uses the same widely used programming language. The ideal machine for learnin about computers, the Electron features full stroke keyboard, 32K memory, full colour graphics and sound generation. It comes complete with 2 manuals: 'The User Guide' and 'Start Programming with the Electron'.

MICRO MARKETS

Amstrad CPC 464

The complete system at an amazing price from Micro Markets

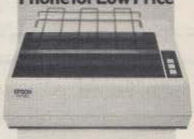
Amstrad's long awaited entry into the micro computer market is a low cost computer that provides the user with everything to just plug-in and get going, with applications ranging from arcade games to business and accounting. Its impressive features include: integral RGB colour monitor or Green Tube VDU, built-in 'speed load' data recorder, 64K memory, 74 key full stroke keyboard, high resolution graphics, 7 octave sound generation and a comprehensive range of software for business, educational and games from Amsoft.

With Green Screen Monitor £239.00
With Full Colour Monitor £349.00

Oric Atmos Computer — Phone for latest Low Price

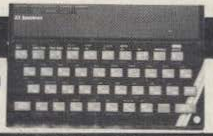
Unlike other micros, the Atmos has a powerful ROM memory which leaves most of the valuable RAM memory for user programming. There are full colour high resolution graphics and special sound effects for games programmers which can be heard through the powerful built-in speaker. Other features include full featured keyboard with sculptured keys and a range of exciting software.

Epson RX80FT Dot Matrix Printer Phone for Low Price



Sinclair Spectrum 48K £129.95 With FREE Software 6 pack (worth £56.70)

This very popular 48K colour computer offers excellent value for money. Featuring full colour high resolution graphics, 10 octave sound range and 44 key keyboard. There is a full range of peripherals and a massive selection of software.



Cumana CSX100 Disk Drive £149.00

Interface 1 and ZX Microdrive. £99.95 per pair

For fast access to large amounts of data each microdrive is capable of holding up to 100K of memory on a single microfloppy disk. The Interface 1 will control up to 8 microdrives and also adds file handling and communication facilities to the Spectrum.

LONDON
Manor Park E12
Kimberley Hi-Fi
698 Romford Road. Tel: 01-478 5137
London N13
SFI Sound Vision
359 Green Lanes, Palmers Green.
Tel: 01-882 5888
London W2
Kimberley Hi-Fi
376 Edgware Road. Tel: 01-724 0454
London SE18
Sevenoaks Hi-Fi & Video
162 Powis Street, Woolwich.
Tel: 01-855 8016
AVON
Bristol
Radford Hi-Fi
53-54 Gloucester Road.
Tel: 0272 428248
Absolute Sound
20 Queens Road, Clifton.
Tel: 0272 249775
BERKSHIRE
Maidenhead
Hi-Fi Markets
18 King Street.
Tel: 0628 73420

BUCKINGHAMSHIRE
Milton Keynes
JCV Hi-Fi & Video
1 Viscount Way, Dukes Drive,
Bleichley. Tel: 0908 367341
CLEVELAND
Middlesborough
Mckenna and Brown
190 Linthorpe Road.
Tel: 0642 246644
ESSEX
Chelmsford
Rush Hi-Fi & Video Centre
5-6 Cornhill. Tel: 0245 57593/64393
Hornchurch
Waters & Stanton Electronics
12 North Street. Tel: 04024 44765
GLOUCESTERSHIRE
Cheltenham
Absolute Sound & Video
42 Albion Street. Tel: 0242 583960
HAMPSHIRE
Aldershot
Bryanns Hi-Fi
81 High Street. Tel: 0252 20728
Andover
Andover Audio
105 High Street. Tel: 0264 58251

HERTFORDSHIRE
Watford
Hi-Fi Markets
68 High Street. Tel: 0923 26169
KENT
Beckenham
Sevenoaks Hi-Fi & Video
51 Beckenham Road. Tel: 01-658 3450
Bexley Heath
Kimberley Hi-Fi
193 The Broadway. Tel: 01-304 3272
Chatham
Sevenoaks Hi-Fi & Video
4 Railway Street. Tel: 0634 46859
Sevenoaks
Sevenoaks Hi-Fi & Video
111 London Road. Tel: 0732 459555
Tunbridge Wells
Sevenoaks Hi-Fi & Video
34 Mount Ephraim. Tel: 0892 33474
LANCASHIRE
Bolton
Cleartone Hi-Fi & Video
156/158 Blackburn Road.
Tel: 0204 22636
Preston
Norman Audio
51 Fishergate. Tel: 0772 53057

LEICESTERSHIRE
Leicester
Mays Hi-Fi
27 Churchgate. Tel: 0533 58662
OXFORDSHIRE
Oxford
Absolute Sound & Video
256 Banbury Road, Summertown.
Tel: 0865 53072
Absolute Sound & Video
19 Old High Street, Headington.
Tel: 0865 65961
SURREY
Croydon
Vision Store
96-98 North End. Tel: 01-681 7539
Kingston upon Thames
Vision Store
3 Eden Walk Precinct. Tel: 01-546 8974
SUSSEX
Brighton
Sevenoaks Hi-Fi
55 Preston Street. Tel: 0273 733338
Haywards Heath
Hi-Fi & Video Markets
13 South Road. Tel: 0444 450333
WARWICKSHIRE
Warwick
JCV Hi-Fi & Video
Wharf Street. Tel: 0926 493796
WILTSHIRE
Swindon
Absolute Sound & Video
60 Fleet Street. Tel: 0793 38222
NORTHERN IRELAND
Belfast
Audio Times
85 Royal Avenue. Tel: 0232 229907

VISA

Head Office: Cousteau House, Greycaine Road, Watford, WD2 4SB. Tel: 0923 27737

All prices quoted in the Micro Markets advertisement are correct at time of going to press (19/9/84) but may be subject to change without notice due to fluctuations in Manufacturers' prices. All Prices include VAT @ 15%
Not all the products featured in Micro Markets advertisement are available at all branches.
Please check before travelling.

MICRO MARKETS

Available exclusively from **DEAN ELECTRONICS** the well proven **ALPHACOM 32** Thermal Printer. Includes full interfacing to the **ZX 81** or **SPECTRUM**. Uses the standard Sinclair print commands (COPY, LLIST, PRINT).
Quiet, maintenance-free, high-speed operation.
Paper £7.00 per box of 5 rolls, each 25m long.

SPECTRUM COMPATIBLE PRINTER

Alphacom 32

This thermal printer, now available in the UK, is the standard printer which has sold in tens of thousands for use with the American version of the ZX81.

£79·95 inc VAT

ADD £2 P&P

DEAN ELECTRONICS LIMITED
Glendale Park Fernbank Road
Ascot Berkshire SL5 8JB
Tel. 0344 885661 Telex 849242

Or from W H Smith, John Menzies, Greens, Laskys, Spectrum Group, Prism, Currys.

Please send me ..... Printer(s) at £81.95 and ..... boxes of paper (5 rolls per box) at £9 per box – all inclusive of post and packing.

Total £ ..... cheque/PO enclosed or debit my Access/Barclay card account No. .....

Name and address .....

.....

.....

Also available –
Alphacom 42 compatible with Commodore 20/64, BBC Centronics, Atari at **£99.95** (+£2p/p) includes selected interface.

---

on·off re·set switch for spectrum

- No more crashing from worn power supply socket
- Does not affect expansion port and use of interfaces
- Just pushes into position does not affect spectrum or power supply lead.
- No need to remove once in position.
- Ergonomically designed – no more fumbling with power supply leads.
- Positive rocker action prevents accidental operation.
- Ideal for re-setting rom cartridge games – saves time when changing microdrive cartridges.

£4.95

I enclose a cheque/postal order for £ _____ payable to TEC Publications, 24 Victoria Road, Bromsgrove, Worcs. c

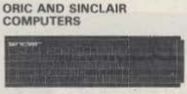
Name _____

Address _____

_____

Dealer Enquiries Welcome. Telephone (0527) 74567

ORIC AND SINCLAIR COMPUTERS



Oric 1 computer 48K £95 (£92) £102. Oric Atmos computer 48K £171 (£168) £168. Oric colour printer £134 (£123) £140. Oric disc drive £304 (£278) 398. New Sinclair QL Computer £406 (£385) £410. Sinclair Spectrum 48K (with 6 free programs while Sinclair's offer lasts) £131 (£131) £143. Microdrive £51 (£50) £60. RS232 interface 1 £51 (£50) £60. Limited period special offer: Microdrive + Interface 1 + 4 Blank cartridges £102 (£100) £120. Blank microdrive cartridges £8 (£8) £9. Interface 2 £20.45 (£20) £24. 32K memory upgrade kit for 16K Spectrum (issue 2 and 3 only) £31 (£28) £30. Fuller Master unit for the Spectrum including speech synthesizer, sound synthesizer, amplifier and joystick port £56 (£56) £62. Fuller FDS full sized keyboard for the Spectrum with proper space bar £52 (£52) £62. Spectrum printer interfaces with cables: Centronics £51 (£47) £52, RS232 £35 (£33) £38. ZX printer has been replaced by the Alphacom 32 £71 (£67) £77. 5 printer rolls (State whether Sinclair or Alphacom) £13 (£16) £21. ZX81 computer £45 (£44) £54. 16K ram packs for ZX81 £28 (£25) £30.

COMMODORE COMPUTERS

Commodore 64 £204 (£184) £204. Vic 20 £104 (£97) £117. Vic 20 starter pack £150 (£143) £173. Convertor to allow most ordinary mono cassette recorders to be used with the Vic 20 and the Commodore 64 £9.78 (£9) £11. Bargain package: cassette convertor + compatible cassette recorder £37 (£36) £44. Commodore cassette recorder £43 (£44) £50. Printer interfaces for Vic 20 and the Commodore 64:- Centronics £45 (£41) £46, RS232 £45 (£41) £46. Disc drive £233 (£209) £234. 1520 printer/plotter £165 (£149) £159. 1525 Printer £235 (£220) £245. 1526 Printer £350 (£330) £360. Light pen £29 (£29) £33. Vic 20 Accessories:- Super expander high res cartridge £33 (£29) £34. Programmers aid cartridge £33 (£29) £34. Extra memory ram packs 8K £19 (£17) £20, 3K £6 (£7) £9.

ACORN COMPUTERS

Electron £203 (£209) £229. Electron joystick and printer interface £61 (£62) £69. BBC Model B £404 (£357) £387. BBC Light Pen £29 (£29) £33. 14" Colour Monitor £228 (£299) £319. Kenda double density dsk interface system £139 (£125) £135. Disc drives 5.25" 40 track- single £200 (£184) £204, dual £356 (£329) £355.

PRINTERS

Brother HR5 £185 (£171) £190. Shinwa CTI CP80 £225 (£218) £248. Cannon PW1080A £332 (£299) £329. Epson RX80 £277 (£251) £282. Epson RX80F/T £314 (£286) £316. Epson FX80 £399 (£358) £388. Combined matrix printers and electric typewriters: Brother EP22 £173 (£166) £186. Brother EP44 £258 (£235) £260. Smith Corona TP1 Daisy wheel printer £262 (£225) £255. MCP40 Oric Colour printer/plotter £134 (£123) £140. Interfaces to run the above printers from Vic and the Commodore 64 £45 (£41) £46. We can supply interfaces to run the above printers from Sharp computers £58 (£52) £59.

SWANLEY ELECTRONICS
The Computer Export Specialists.
Dept YC, 32 Goldsel Rd., Swanley, Kent BR8 8EZ England.
Tel: SWANLEY (0322) 64851.

Official orders welcome. UK prices are shown first and include post and VAT. The second price in brackets is for export customers in Europe and includes insured airmail postage. The third price is for export customers outside Europe (including Australia etc) and includes insured airmail postage.

The Sinclair QL and you

Exploring the Sinclair QL — An Introduction to SuperBASIC

Andrew Nelson, £4.95

The QL has a rich, new programming vocabulary, and this great book gives you the chance to master the host of new words Sinclair has added. Sure, you can use the QL more or less just like a Spectrum, but if you do, you are missing the extraordinary power which lies behind the radical concepts of SuperBASIC. Command by command, statement by statement, Andrew Nelson takes you through the richness of QL SuperBASIC in *Exploring the Sinclair QL — An Introduction to SuperBASIC*. Just £4.95 and available from most book and computer shops. In case of difficulty, you can order it directly from Interface Publications, using the coupon below. (Trade only: Interface Publications are distributed exclusively in the UK and Eire by W H S Distributors. Export orders handled by Interface Publications.)

Interface Publications, Department QYC, 9-11 Kensington High Street, London W8 5NP.

Please send me the following books.
I enclose a total of £_____

- ☐ **Exploring the Sinclair QL — An Introduction to SuperBASIC** — Andrew Nelson, ISBN 0 907563 84 8 — £4.95
- ☐ **49 Explosive Games for your ZX Spectrum** — Tim Hartnell, ISBN 0 907563 53 8 — £4.95
- ☐ **Delving Deeper into your VIC 20** — Philip Campbell, ISBN 0 907563 62 7 — £4.95
- ☐ **Creating Adventure Games on your Dragon 32** — Clive Gifford, ISBN 0 907563 57 0 — £4.95
- ☐ **Dynamic Games for your VIC 20** — Mathew Boek, ISBN 0 907563 34 1 — £4.95
- ☐ **Creating Adventure Programs on your Computer** — Andrew Nelson, ISBN 0 907563 36 8 — £4.95
- ☐ **Putting your VIC 20 to Work** — Tom Lau, ISBN 0 907563 46 5 — £4.95
- ☐ **The Easy Way to Program your New Computer** — Tim Hartnell, ISBN 0 907563 60 0 — £3.95
- ☐ **Creating Adventures on your ZX Spectrum** — Peter Shaw & James Mortleman, ISBN 0 907563 58 9 — £4.95
- ☐ **Practical Uses for the Microcomputer in the Home** — David Hole, ISBN 0 907563 59 7 — £4.95
- ☐ **Mastering Machine Code on your Commodore 64** — Mark Greenshields, ISBN 0 907563 69 4 — £7.95
- ☐ **Making the Most of your TI 99/4A** — Scott Vincent, ISBN 0 907563 66 X — £4.95
- ☐ **Dynamic Games for your Electron** — Neal Cavalier-Smith, ISBN 0 907563 67 8 — £4.95
- ☐ **The 3-D Animated Apple** — Phil Cohen, ISBN 0 907563 78 3 — £4.95
- ☐ **The Art of Structured Programming** — Peter Juliff, ISBN 0 907563 79 1 — £5.95
- ☐ **Dynamic Games for your TRS-80** — Gail Duns & Tim Hartnell, ISBN 0 907563 63 5 — £3.95

Name.....

Address.....

.....

..... QYC

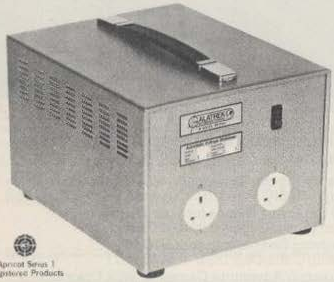
INTERFACE PUBLICATIONS

We're the experts!

Don't blame the equipment- it's most likely the mains!

In a perfect world, with a perfect power supply you'd have a right to expect perfect results from your computer, word processor, VDU or other electronically controlled equipment. Sadly, this is not always the case, due to mains borne interference. Even a dedicated line is only a partial solution because interference is generated by other equipment being used around you, typewriters, copiers, fluorescent lights and even the office 'fridge.

Galatrek do have an answer —



Apricot Series 1
Registered Products

the Ferro-Resonant Line Conditioner.

Simply plug it into the mains and your unit into the socket provided. Spikes, transients and other mains borne interference are now trapped in its circuits and voltage surges or dips are also catered for, as the output is highly stabilised. It also protects itself and the equipment against overload and gives system isolation. If you specify when ordering, it can be used as a step down or step up voltage supply.

You've nearly arrived at your perfect world — for as little as £145 + VAT.

The Galatrek Filter Plug, whilst only rated to carry 2 amperes of current, is designed to protect micros, minis and word processors from interference and surges. The transverse and common mode attenuation circuits are very effective for these low powered units. Easily fitted, it simply replaces your existing 3 pin plug.

Price £19.95 + VAT.

Send for details or cash with order.

Master Distributor and Dealer applications invited.

GALATREK INTERNATIONAL

Galatrek International Ltd.
Scotland Street, Llanrwst, Gwynedd, LL26 0AL, North Wales.
Telephone: Llanrwst (0492) 640311 Telex: 617114 A/B GALAHU

COMMODORE 64

BRING YOUR 64 TO LIFE WITH.....

LIGHTNING LOAD

★CONVERTS ALMOST ALL YOUR FAVOURITE SOFTWARE & GAMES INTO A SUPERFAST LOADING VERSION
★YOUR CASSETTE PROGRAMS WILL INDEPENDENTLY LOAD FASTER THAN THE COMMODORE DISC DRIVE!!
★LIGHTNING LOAD HAS SOPHISTICATED FEATURES WHICH LEAVE OUR COMPETITORS LIGHT YEARS BEHIND
★COLOUR & SOUND ARE USED IN SPECTACULAR & UNIQUE WAYS TO ENHANCE THE PROGRAM
★100% MACHINE CODE, FLEXIBLE MENU SYSTEM ALLOWS SAVING OF MORE THAN 48K CONTINUOUS RAM
★THIS AMAZING PROGRAM IS NOW ON SPECIAL OFFER ~~£7.95~~ NOW £6.95 incl P&P

★ ★ ★ ★ ★ ★ ★

COPYCAT

THE ULTIMATE BACK-UP TAPE COPIER

★MAKES BACK-UP COPIES OF ALMOST ALL SOFTWARE
★SPECTACULAR MULTICOLOURED LOAD AND SAVE
★WIZARD AUDIO SOUND EFFECTS
★CASSETTE MAGIC SENSE
★100% MACHINE CODE TAPE COPIER WITH FULL INSTRUCTIONS
★CAN YOU FIND A BETTER COPIER? – WE CAN'T!
★SUPERB VALUE AT £5.95 incl. P&P

DISPATCH OF THESE PROFESSIONAL PROGRAMS WITHIN 24 HOURS!
CHEQUES/P.O.'s TO:

WIZARD SOFTWARE (Dept. YC)
59 THE MARLES, EXMOUTH, DEVON EX8 4NE

MAIL ORDER PROTECTION SCHEME

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Your Computer* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided that:

(1) You have not received the goods or had your money returned; and
(2) You write to the Publisher of of *Your Computer* summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claims and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent.

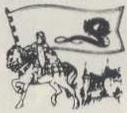
This guarantee covers only advance payment sent in direct response to an advertisement in this magazine not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements. Classified advertisements are excluded.

LTS

Have an adventure of your own

The first educational adventure generators of their kind. Each program comes complete with two adventures which will provide hours of constructive use and stimulus for other activities. Plus the facility to create your own adventures including your own characters and locations. Adventures can be saved on to tape or disc for later use. No programming necessary. Easy to use.

Your Adventure
A first level adventure generator for 7 to 13 year olds. Including colour graphics, map, planning sheet and full instructions.
BBC(B) tape or disc, RHL 380Z/480Z disc, SPECTRUM 48K and COMMODORE 64 tape. **£10.95**



Space Adventure
A second level adventure generator for 8 to 14 year olds allowing the creation of more complicated adventures. Includes colour graphics, animated reward, planning sheet and full instructions.
BBC(B) tape or disc, SPECTRUM 48K and COMMODORE tape. **£11.95**

Mathemagic Land
A highly original mathematical adventure for 10 to 15 year olds with 3 levels of difficulty and ever changing problems. Can be used again and again. A stimulating and absorbing game.
BBC(B) tape or disc. SPECTRUM and COMMODORE versions planned. **£8.95**

Developed by experienced teachers through the Government's Microelectronics Education Programme.

Discounts for schools. Official education orders accepted. Overseas prices on application.
All prices include VAT. Postage £1.00 for 1 program, £1.50 for 2, £2.00 for 3 or more.

LTS publish a wide range of programs for English, Maths, Basic Skills, Problem Solving, etc., many sponsored by the Government's Microelectronics Education Programme.

Full catalogue available. S.A.E. please.

Learning and Training Systems Ltd.

Haydon House, Alcester Road, Studley, Warwickshire B80 7AP
Tel: (0386) 792617

HISOFT

ULTRAKIT £9·45

The most powerful toolkit yet for ZX BASIC. All the features you will ever need; AUTO insert, full RENUMBER, block DELETE, CLOCK, ALARM, error trapping, break trapping. Full TRACE with single-step and much, much more. Makes ZX BASIC easy-to-use and powerful.

DEVPAC £14

An excellent assembler, an advanced line-editor, a comprehensive disassembler and a superb 'front panel' debugger all in one package. Used by many leading software houses to write their games. "Buy it!" Adam Denning 1984.

PASCAL £25

A powerful and almost full implementation of Pascal - not a Tiny Pascal. A valuable educational and development tool, programs typically run 40 times faster than a BASIC equivalent. Spectrum version includes Turtle Graphics package. "I haven't seen any other compiler that could match Hisoft's Pascal"

HISOFT
180 High Street North
Dunstable, Beds. LU6 1AT
Tel: (0582) 696421

HISOFT

for the ZXSpectrum

Hisoft is pleased to announce a new compiler for this popular and effective systems programming language. Not a tiny-C but an extensive, easy-to-use implementation of the language. Allows direct execution of compiled statements. Supplied with function library. Available direct from Hisoft for £25, or write for further details.

All prices, UK delivered, relate to 48K ZX Spectrum versions. Our software is available for many other Z80 machines e.g. Amstrad CPC 464, MSX, Memotech, SHARP MZ700, New-Brain, CP/M etc. Please write for details.

SINCLAIR
ORIC, COMMODORE
ACORN, MEMOTECH, ETC

MICRO---EXPORT

We export Microcomputers
and Peripherals to all Countries
Any make. Any Quantities
BIG DISCOUNTS

send for comprehensive price list to:
Dept K
MICRO-X LTD
765-767 HARROW ROAD, LONDON NW10 5NY
TELEPHONE 01-968 6622 TELEX 915866 MICROX G.

The problems of looking after your Micro...

As well as providing the solution to many a problem, Micro's however do present more than a few of their own.
Like how do you prevent it gathering dust when not in use, stop it from getting kicked when Mum's cleaning the lounge, divert the dog from showing it his affections, or even ensure it at least "arrives" safely when Dad decides to take it down to the local.

We at P.A.S. realising these needs, have now developed a range of three superbly made protective cases designed specifically for Micro's. Each case is constructed from Solid Resin Fibreboard has a fully protective foam lining a carrying handle internal retaining strap, a double snap-fastening lid and a price that defies even Micro logic.

Please help, I am a long suffering Micro owner and wish to purchase ..... case/s (tick appropriate box) HC/1 HC/2 HC/A

I enclose cheque/P.O. to the value of .....

NAME .....

ADDRESS .....

Please allow 21 days for delivery. Trade enquiries welcome.

Prices apply to U.K. only.

PAS

PAS COMPUTER PRODUCTS LIMITED
UNIT 18, CENTRAL TRADING ESTATE,
STAINES, MIDDLESEX TW18 4UX.
Telephone Staines (STD 0784) 62781

CASE HC/1 Takes Micro's – ZX81, ZX Spectrum, Oric 1, CGL M5. CASE HC/2 Takes Micro's – VIC20, BBC 'B', Commodore 64, Texas TI-99, Oric 1, Dragon 32, Colour Genie, Sharp MZ700, Acorn Electron, Lynx, Tandy Colour, Atari 600XL, Acorn Atom. CASE HC/A Can be adapted to take any of the above computers and various accessories such as Tape Recorder, printer etc.

What's New For Christmas? See For Yourself

The Christmas ZX MICROFAIR

GO ON A SHOPPING SPREE FOR ALL YOUR

NEW SPECTRUM AND QL GOODIES!

— MANY AT SPECIAL SHOW PRICES —

TWO FANTASTIC DAYS

17th and 18th NOVEMBER 1984

AT ALEXANDRA PALACE, WOOD GREEN, LONDON N22.

ADMISSION ONLY £1.50(Adults) £1.00(Kids)

Come along on Saturday or Sunday 17th and 18th November to the Show that shows you everything for Sinclair Computer enthusiasts!

Why spend weeks looking for Christmas presents . . . one day at the Christmas ZX MICROFAIR will take care of everything!

And you'll have a fantastic day out . . . meeting friendly people . . . having fun . . . full of Christmas cheer!

Send now for reduced price advance tickets — and don't forget to note the date!

EXHIBITORS!

JOIN THE RUSH . . . CALL MIKE JOHNSTON OR MOIRA ON 01-801 9172 FOR FULL DETAILS OF STAND AVAILABILITY . . . DO IT *NOW!*

SEND FOR REDUCED PRICE ADVANCE TICKETS NOW AND BE FIRST IN THE QUEUE!

14th ZX MICROFAIR
ALEXANDRA PALACE, WOOD GREEN, LONDON N22
SATURDAY AND SUNDAY
17th and 18th NOVEMBER 1984
Saturday 10.00 am to 6.00 pm
Sunday 10.00 am to 5.00 pm

Post to: Mike Johnston, ZX MICROFAIR, Dept YC, 71 Park Lane, Tottenham, London N17 OHG. Tel: 01-801 9172.

Please send me ADVANCE TICKETS for the Special Christmas ZX MICROFAIR.

I require the following:— ..... Adult tickets @ £1.25. ..... Children's tickets @ £0.80p for Saturday/Sunday (Delete as applicable)

I enclose cheque/P.O. made payable to ZX MICROFAIR for the full amount (please include cheque card number on the back of cheques) and I also enclose a STAMPED SELF-ADDRESSED ENVELOPE for return post.

Name:.....

Address:.....

.....

Cash & Carry COMPUTERS

TOP SHOWROOM SERVICE

ROCK BOTTOM PRICES

PERSONAL CALLERS WELCOME AT OUR EXTENSIVE SHOWROOMS MOST EQUIPMENT ON DEMONSTRATION

The UK's Best Printer Prices

Only a sample of our massive range of printers shown here — phone for further details

DAISYWHEEL LETTER QUALITY		
Smith Corona TP1 (P or S)	£189.00 + VAT =	**£217.35**
Juki 6100 (P)	£335.00 + VAT =	**£385.25**
Brother HR15 (P)	£335.00 + VAT =	**£385.25**
Daisystep 2000	£239.95 + VAT =	**£275.94**
PRINTER/TYPEWRITERS		
Brother EP22 Dot Matrix (S)	£119.00 + VAT =	**£136.85**
Brother EP44 (S)	£189.00 + VAT =	**£217.35**
Modems available for Easylink and Telecom Gold		
Juki 2200 Daisywheel (P or S)	£239.95 + VAT =	**£275.94**
DOT MATRIX PRINTERS		
Brother HR5 (P or S)	£129.00 + VAT =	**£148.35**
Canon 1080A NLQ (P)	£289.00 + VAT =	**£322.35**
Canon 1156A NLQ (P)	£349.00 + VAT =	**£401.35**
EPSON RX80 (P)	£195.00 + VAT =	**£224.25**
EPSON RX80 F T (P)	£225.00 + VAT =	**£258.75**
EPSON FX80 (P)	£324.00 + VAT =	**£372.60**
EPSON RX100 F T (P)	£339.96 + VAT =	**£390.95**
EPSON FX100 F T (P)	£439.00 + VAT =	**£504.85**
Seikosha GP100A (P)	£129.90 + VAT =	**£149.39**
Seikosha GP50A (P)	£79.90 + VAT =	**£91.89**
Seikosha GP80S (Spectrum)	£79.90 + VAT =	**£91.89**
Seikosha GP500A (P)	£139.90 + VAT =	**£160.89**
Seikosha GP550A (P)	£179.90 + VAT =	**£206.89**
Seikosha GP700A Colour (P)	£279.90 + VAT =	**£321.89**
Shinwa CT80 (P)	£175.00 + VAT =	**£201.25**

(P)=Parallel-Centronics (S)=Serial RS232

Smith Corona range of printers Now in Stock — Phone or write for details

12" MONITORS — GREEN SCREEN		
Sanyo 8112 Med Res	£65.00 + VAT =	**£74.75**
Sanyo 8112 High Res	£88.00 + VAT =	**£101.20**
14" MONITORS — COLOUR		
Commodore 1701 Composite/Sound	£173.00 + VAT =	**£198.95**
Fidelity CM14 RGB/Comp/Sound	£179.00 + VAT =	**£205.85**
Microvitec 1431MS Norm Res RGB	£173.00 + VAT =	**£198.95**
Microvitec 1431MZ for ZX Spectrum	£199.00 + VAT =	**£228.85**
Microvitec 1451MS Med Res RGB	£269.00 + VAT =	**£309.35**
Microvitec 1451DA for Sinclair QL	£234.74 + VAT =	**£269.95**
Microvitec 1441MS High Res RGB	£379.00 + VAT =	**£435.85**
Sanyo 3125 Norm Res RGB	£173.00 + VAT =	**£198.95**
Sanyo 3117 Med Res RGB	£285.00 + VAT =	**£327.75**
Sanyo 3115 High Res RGB	£398.00 + VAT =	**£458.85**
Commodore		
Plus 4 NEW 64K Computer	£219.95 + VAT =	**£252.94**
C16 Starter pack inc. cassette deck	£104.30 + VAT =	**£119.95**
C2N Cassette	£32.61 + VAT =	**£37.50**
DPS1101 Daisywheel Printer (by Juki)	£309.35 + VAT =	**£356.44**
801 Tractor Printer	£169.17 + VAT =	**£189.95**
802 Friction Tractor Printer	£260.83 + VAT =	**£299.95**
1520 Colour Printer Plotter	£60.83 + VAT =	**£69.95**
1701 Colour Monitor	£173.00 + VAT =	**£199.00**
Amstrad		
Amstrad CPC464 Green Monitor	£192.00 + VAT =	**£220.80**
Amstrad CPC464 Colour Monitor	£289.00 + VAT =	**£332.35**
SANYO MBC 555 Business Computer		
128K including Wordstar, Calcstar, Infostar	£795.00 + VAT =	**£914.25**
BBC		
BBC Model B	£339.09 + VAT =	**£389.95**
Model B inc Disk I.F.	£399.96 + VAT =	**£459.95**
Cumana 1x100K DD CSX100	£126.00 + VAT =	**£144.95**
Cumana 1x200K DD CSX200	£181.26 + VAT =	**£219.95**
Cumana 2x100K DD inc PSU	£321.70 + VAT =	**£369.95**
Cumana 2x200K DD inc PSU	£347.78 + VAT =	**£399.95**
Cumana 2x400K DD inc PSU	£434.74 + VAT =	**£499.95**

All above Cumana Disk Drives include Cable, Manual + form disk

Sinclair		
Spectrum 48K + 6 Free Games (worth £56)	£106.91 + VAT =	**£122.95**
Microdrive	£41.30 + VAT =	**£47.50**
Interface I	£41.30 + VAT =	**£47.50**
16K-48K Upgrade	£21.70 + VAT =	**£24.95**

INSTANT CREDIT Up to 36 months to pay

All items over £150 available on our easy credit terms. Written details available on request.

SUPERDISKS

LONDON'S LOWEST PRICES ON FLOPPY DISKS

Prices per box of ten ex VAT

	SSDD 40TR	DSDD 40TR	SS96TP1 80TR	DS96TP1 80TR
BASF 5¼"	**£10.95**	**£18.20**	**£19.80**	**£22.50**
3M 5¼"	**£13.55**	**£19.50**	**£20.05**	**£24.00**
VERBATIM 5¼"	**£15.50**	**£23.50**	**£22.50**	**£30.50**
DYSAN 5¼"	**£16.80**	**£24.90**	**£24.90**	**£32.00**
TDK 5¼"	**£17.50**	**£25.50**	—	**£33.00**
BASF 3½"	**£34.90**	—	—	—

Add 70p for P&P per box of 10 disks

BUSINESS SOFTWARE

We have a wide range of business software at our normal discount prices.
All prices ex VAT. Add 70p for P&P per order.

Wordstar	£195
Open Access	£360
Lotus123	£295
Symphony	£490
Multimate	£240
D Base II	£260
DMS Delta	£395
Findex	£135
Framework	£345

Please state computer format required when ordering.

Mail Order+Export+Trade Hot Line Phone 01-686 6362

Delivery by Securicor (3 day) please add £5.00 + VAT per item.
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

Send off the coupon or order by 'phone quoting your Access, Barclaycard No. 'Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance.

Or you can Telex your order on: 946240 Attn 19001335

We accept official orders from PLC's, Government Departments and Educational establishments.

These prices correct until superceded by next advertisement.

To: Cash & Carry Computers, 53-59 High Street, Croydon, Surrey CR0 1QD

Please supply _____

_____

I enclose my cheque for £_____ including delivery by Securicor/T.N.T.*

or charge my Access/Barclaycard No. _____

Name _____ Signature _____

Address _____

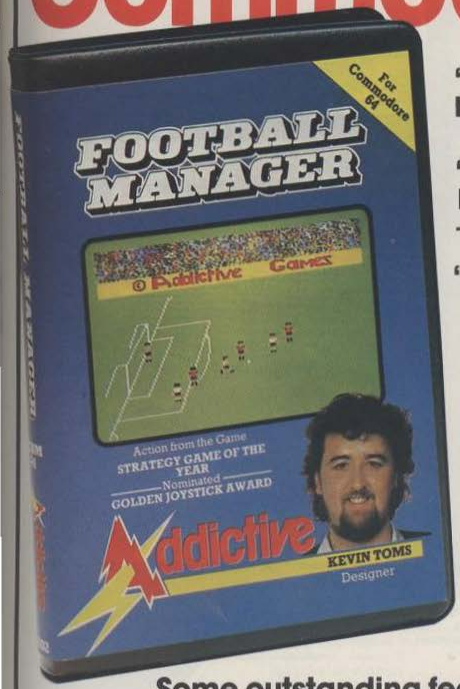
*Please Delete YC 11

CASH & CARRY COMPUTERS

53-59 High Street, Croydon, Surrey CR0 1QD.

IT'S HERE!

FOR THE Commodore 64



"Absorbing and realistic – Highly recommended"
– Sunday Times, February 1984

"Completely fantastic – I want one!"
– Charlie Nicholas, Arsenal striker in Big K, April 1984

"Having chosen your players the match highlights are then displayed in very good animated 3-D Graphics. ...There are many other excellent features in this game in fact the attention to detail is outstanding (5 out of 5)."
Popular Computing Weekly – 16 August 1984

£7·95

Some outstanding features of the game

• Matches in 3D graphics • Transfer market • Promotion and relegation • F.A. Cup matches • Injury problems • Full league tables • Four Divisions • Pick your own team for each match • As many seasons as you like • Managerial rating • 7 skill levels • Save game facility • Financial manipulations • 4 divisions and customising feature • You can even be sacked!

Available from computer software stockists nationwide, including Boots & WHSMITH John Menzies

Prices: BBC Model B £7·95
Spectrum 48K £6·95
ZX81 16K £5·95
(N.B. 3D GRAPHICS ARE NOT INCLUDED IN THE ZX81 VERSION)
Overseas orders add £1·50

To order by mail (p&p free) send cheques or postal orders to:

Addictive Games
7A Richmond Hill, BOURNEMOUTH, BH2 6HE

ALSO FOR BBC 32K SPECTRUM 48K & ZX81 16K

NOT JUST A PRETTY Inter FACE!

This superb new interface is one of our very latest developments for your Spectrum.
Offering even more features, and as it's programmable from the keyboard or with the cassette supplied you can now use it with any software.

Features include:-

- 17 directional movement
- Keyboard fully functional
- Rear connector for other add-ons
- Microdrive compatible

ONLY £22.95

NOT JUST A PRETTY Inter FACE!

The Spectrum dual port joystick interface is a highly versatile and price competitive joystick interface offering two joysiick ports.
The first port simulates 6,7,8,9, & 0 keys. The second port simulates in (31) command.
The ports will accept any Atari style joystick.
It will run any software. That is:-

- Using keys 6,7,8,9 & 0.
- Having redefinable key functions.
- Using in (31) (i.e. Kempston).

ONLY £13.00

NOT JUST A PRETTY Inter FACE!

The new **dktronics** Parallel Centronics Interface will link your Spectrum to any printer with a standard centronics input. As the choice is vast, you can select the printer exactly suited to your needs.

Features of the Interface include:

- Runs all parallel centronics type printers
- Controlling software fully relocatable
- Interfaces with any software using the printer channel e.g. Tasword Dev pack etc.
- LIST LPRINT recognised. High res screen dumps
- All control codes allowed through to printer
- Fully microdrive compatible
- Supplied with full instructions and controlling software

All **dktronics** products are covered by a comprehensive guarantee.

ONLY £39.95

NOT JUST A PRETTY Inter FACE!

Our new generation light pen and interface is designed specifically for your Spectrum and works down to pixel level for complete accuracy.
Now you can produce high resolution illustrations with the 16 pre-defined instructions, selected from the screen controlled menu. Change colour, border, paper, ink. Draw circles, arcs, boxes or lines. You can fill in objects with colour, insert text or draw freehand, save and load completed or partially completed screens onto and from a tape and with a 48K Spectrum retain screens in memory and animate.
You can also use the machine codes in your own programmes for selecting from a menu, playing games etc. (all entry points supplied).
The interface fits neatly into position and comes complete with software cassette.

ONLY £19.95

Please rush me the following:

Programmable Interface(s)	£
Dual Port Interface(s)	£
Parallel Centronics Interface(s)	£
Light Pen and Interface(s)	£
Please add post and packing	£ 1.25
I enclose cheque/PO/Cash for	Total £
or debit my Access/Barclaycard No.	

Signature _____ Name _____

Address _____

Or send S.A.E. for the New D.K.Tronics Spectrum Catalogue

YC/11/84

dktronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

THE FINAL TOUCH

We've just added the final touch to our professional keyboard.
This new Microdrive compatible keyboard offers more key functions than any other in its price range. And the stepped keys and space bar make it even easier to use. Our keyboard, constructed from high density black ABS, will take your Spectrum into the professional league.
It has 52 "stepped" keys plus space bar. A separate numeric key pad consisting of 12 red keys including a single entry 'delete' plus single entry 'decimal point', facilitate fast numeric data entry.
The 15" x 9" x 3" case will accommodate your Spectrum and other addons like interface 1, power supply etc. and forms an attractive self-contained unit.
All connections, power, Mic, Ear, T.V., network RS232 and expansion port are accessible at the rear.
A few minutes, a screwdriver and the simple instructions supplied are all you need to fit your Spectrum.
All dktronics products are covered by a comprehensive guarantee.

Constructed from high density block ABS

All connections accessible at rear

FOLLOW OUR LEAD FOR THE RIGHT CONNECTIONS

MICRO DRIVE EXTENSION LEAD

This is an 8" version of the micro 16 way drive lead. Sinclair's lead is only 4" long and for many applications this may not be long enough. It enables you to space the micro drive much further away from Interface I.

56 WAY RIBBON CONNECTOR

This is an extension cable that enables Spectrum peripherals to be distanced from the computer.
It is supplied 9" in length and will allow male or female connections to be made to the computer.
The connector has special lugs to enable easy fitting/removal from the computer's expansion port.

WINNING IS WITHIN YOUR GRASP

Quickshot Joystick I

- Super positive response
- 2 fire buttons
- Stabilising suction caps
- 4ft lead

Quickshot Joystick II

Incorporating all the features of 'Quickshot I' plus

- Improved control grip
- Trigger fire button
- Rapid fire option

SOUND IDEAS FOR YOUR SPECTRUM

Three Channel Sound Syntheiser interface incorporates a BEEP audio amplifier and a 3 channel sound sytheiser.
The BEEP amplifier improves the sound quality and output of the BEEP enormously. The 3 channel sound synthesiser adds a totally new dimension to sound on your Spectrum. It allows you to program your own music with harmonies, explosions, zaps, chimes, whistles and an infinite range of other sounds over a full 8 octaves.
Based around the popular AY-3-8912 sound chip it gives you complete control (from basic or M/C) over 3 channels of tone and/or white noise, plus envelope and volume control. It comes with it's own pod mounted (4") speaker with 1 metre of cable so that it can be positioned anywhere.
Once this is fitted to the expansion port your programmes will never sound the same again!

Please rush me the following:

Microdrive Compatible Keyboard(s)	£
Microdrive Extension Lead(s)	£
56 Way Ribbon Connector(s)	£
Quickshot Joystick(s) I	£
Quickshot Joystick(s) II	£
Three Channel Sound Syntheiser	£
Please add post and packing	£ 1.25
I enclose cheque/PO/Cash for	Total £

or debit my Access/Barclaycard No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature _____ Name _____

Address _____

Or send S.A.E. for the New D.K.Tronics Spectrum Catalogue

YC/11/84

dktronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

HATS OFF TO ME

☐ Please send me your free catalogue.
Please send me:

COMMODORE 64 BOOKS

☐ Commodore 64 Games Book 2	£6.95
☐ Supercharge Your Commodore 64	£5.95
☐ Commodore 64 Software Projects	£6.95
☐ Complete Commodore BASIC Course	£9.95
☐ Commodore 64 Machine Language for the Absolute Beginner	£6.95

SPECTRUM BOOKS

BOOKS

☐ Spectrum Software Projects	£6.95
☐ Complete Spectrum BASIC Course	£9.95
☐ Micronet Book	£6.95

GENERAL BOOKS

☐ Z80 Reference Guide	£9.95
☐ A Guide to Playing The Hobbit	£3.95
☐ Computer and Video Games Book of Adventure	£5.95
☐ Learning With Adventure Programs	£5.95

BBC BOOKS

☐ Building Blocks for BBC Games	£5.95
☐ BBC Software Projects	£6.95
☐ Guide to BBC ROMs	£9.95
☐ BBC BASIC for Beginners	£7.95
☐ Complete BBC BASIC Course	£9.95
☐ BBC Hardware Projects	£9.95

Orders to:
Melbourne House Publishers
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Church Yard
Tring
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

£

£ +p/p .80

Total

£

All prices include VAT where applicable. Please add 80p for post and pack.

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5001.

I enclose my cheque/money order for £

Please debit my Access Card No. Expiry Date

Signature

Name

Address

Postcode YC11b

GSH

BOURNE HOUSE!

Commodore 64 Games Book 2. Just when you thought it was safe to go back to your micro... here's 30 more exciting new and original games for your Commodore 64. Every game has been specifically designed so you learn programming skills as you go. There's arcade games, strategy games and games you can modify and develop yourself. With CHEXSUM, typing in is easier, and mistakes are quickly located. A must for all Commodore owners.

Spectrum Software Projects is a special book which will enable you to create useful programs and learn more about programming.

Software Projects gives you program ideas, discusses the overall set-up and an outline of the various procedures. You write the programs, and Software Projects tells you how to test it or offers hints and clues on how to do it. Create six useful programs, ranging from information management to business programs and games.

Z80 Reference Guide is an essential book for anyone involved in Z80 machine language programming. The well laid out format of this book will make it clearer to understand the capabilities of the Z80 instruction set.

All opcodes are HEX and decimal, making machine language programs for basic programmers easier to implement. The Z80 Reference Guide is an indispensable book if you are interested in learning machine language programming skills.

Building Blocks For BBC Games is the book for all BBC enthusiasts! Using a unique modular method you can create and build exciting, original games and programs.

The ready-made building block system has all the procedures you need. Step-by-step you write a BASIC program with the minimum of effort. Then you can expand your programs with even more procedures and innovations into complex and exciting routines.

Simply written, easy to follow, BBC Building Blocks will enable you to learn more about your micro than you believed possible.

The Complete Commodore BASIC Course is a comprehensive book which will immediately become an indispensable learning tool for all your Commodore programming. All is revealed in our easy, step-by-step guide with programs and "test yourself" exercises. The appendices explain the major pitfalls that you may encounter in each problem. Even if the idea of writing programs is completely mystifying to you this book will show you just how easy it is and how much fun you can have learning. In no time you will be able to write and enjoy complex programs. If you want to learn to program your Commodore then The Complete Commodore BASIC Course is the book for you.

Seeing is

You'll see the difference from the moment you pick up one of the games from Firebird's new Silver Range.

We keep our flights of fancy for the game. On the pack, you'll find there is a true representation of the high quality screen graphics.

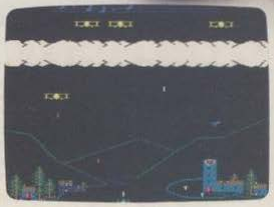
Here's a sneak look at three of the NEW games:

BOOTY

Well shiver me timbers and splice the mainbrace and pass the grog, me hearties. Here be the greatest pirate adventure of them all, aboard that scourge of the Seven Seas – the dreaded Black Galleon. Feast yer eyes on the BOOTY-ful treasure stored in 20 holds. There be pirates, parrots and fun galore. If you don't like it, matey, we'll hang you by the highest yard-arm!!!

THE WILD BUNCH

Blamed for a murder you did not commit, your only hope is to identify and capture the real killer – a member of the notorious gang, The Wild Bunch. But can you also survive life on the run in this adventure set in the Wild West...



BIRD STRIKE

Wing a plane to release a carrier pigeon... shoot the carrier pigeon and add a note to the stave at the top of the screen... shoot enough pigeons to complete the tune (without getting wiped out by the relentless, pursuing planes)... next wave.

Look out for these games in the FIREBIRD silver range at selected high street stores.

SPECTRUM: THE WILD BUNCH · BOOTY · MR. FREEZE · TERRA FORCE · VIKING RAIDERS · MENACE · BYTE BITTEN · EXODUS · RUN BABY RUN ·
COMMODORE 64: BOOTY · MR. FREEZE · EXODUS · HEADACHE · ZULU ·
VIC 20: SNAKE BITE · MICKEY THE BRICKY ·
BBC MICRO B: BIRD STRIKE · GOLD DIGGER · ACID DROPS · DUCK!

believing

There are twenty games now available from Firebird, and that's just the beginning. All the software is produced to the same high professional standards and all are available at the remarkably low price of

£2.50

FIREBIRD

SOFTWARE

The new range from British Telecom. **You'd better believe it!!!**

FIREBIRD SOFTWARE, WELLINGTON HOUSE, UPPER ST. MARTIN'S LANE, LONDON WC2 9DL. TEL: 01-379 6755/5626

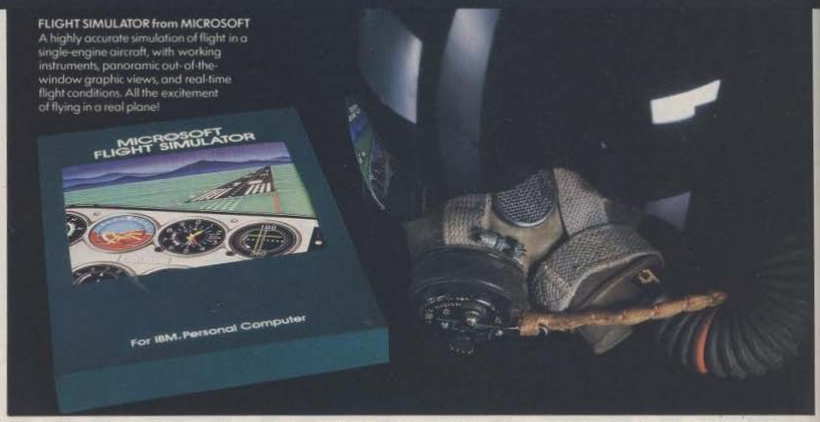
Firebird and the Firebird logo are trademarks of British Telecommunications plc.

SORCERER from INFOCOM.
The most powerful leader of the Enchanters must be found, tracked through treacherous mists of time, avoiding the evil sorcery where terrible death awaits, and gaining the powers and cunning of a true sorcerer.

TOUCH TABLET from KOALA.
The friendly, easy way to use your computer, as a graphics tablet to write or draw on the screen, as a paddle controller or joystick, as a custom keyboard, as a way to make music, play games, create graphs, all at the Touch of a Tablet!

THE ENTERTAINERS

FLIGHT SIMULATOR from MICROSOFT
A highly accurate simulation of flight in a single-engine aircraft, with working instruments, panoramic out-of-the-window graphic views, and real-time flight conditions. All the excitement of flying in a real plane!



The Softsel dealer has all the software you should need: recreation, home, education and business. When you want the best service, go to a Softsel dealer who has the best back-up in the world.

Aberdare Glamorgan Inkey Computer Services (0685) 881828. **Birmingham** Home Entertainment (021) 643 9100. The Software Shop (021) 622 3289. **Bradford** Pace Software Supplies (0274) 72 9306. **Brighton** Gamer (0273) 698424. **Bristol** Softalk City (0272) 877245. **Chalfont St Peters** Softshop (0753) 88901. **Chester** Computer Link (0244) 316516. **Guernsey** Guernsey Computers (0481) 28738. **Jersey** Audio & Computer Centre (0534) 7400. **Leighton Buzzard** Milton Keynes Music (0525) 376622. **London** Games Workshop NW10 (01) 965 3713. Adv Technology Centre SE9 (01) 859 7696. Chromasonic Personal Computers N19 (01) 263 9493. Davinci Computers NW4 (01) 202 2272. Pilot Software City W1 (01) 636 2666. Programs Unlimited W1 (01) 487 3351. Software City 382 Kings Road SW3 (01) 352 9220. Vic Odden's SE1 (01) 403 1988. Video Palace W1 (01) 637 0366. Woodland Software W1 (01) 960 4877. The 64 Software Centre WC1 (01) 430 0954. Tomorrows World Today W1 (01) 437 2040. **Maidstone** Galaxy Video (0622) 682575. **Manchester** Quadsport (061) 969 8729. **Paignton** Devon Computers (0803) 526303. **Preston, Lancs** Channel 8 Software (0772) 53 057. **Redditch** MCL (0527) 26051. **Sidcup** Silica Shop (01) 301 1111. **Skipton** Singleton (0756) 60 078. **Slough** Silicon Chip (75) 70639. **Southampton** Microchips (0703) 38899. **Stafford** Computerama (0785) 41899. **Teddington** Photographical and Optical Services (01) 977 3498/9. **Wallasey** Microbyte (051) 630 6933. **Waterlooville** G B Microland (0705) 259911. **Weymouth** Silicon Chip Comps (030 57) 87592. **Whitstable** 64 Supplies (0227) 266289. **Worthing** Data Direct (0903) 40509. **York** York Computer Centre (0904) 641862.

SOFTSEL®
The number one source for software. In the world.

*Registered trademarks.

UNBEATABLE VALUE

ibico LETTER QUALITY PRINTER

A compact (12" x 2½" x 8"), letter quality printer from Classic Computers with a host of outstanding features at the unbelievable price of £229.00 inc. VAT.

Plugs straight into most computers, with optional adaptors available for Commodore 64 and Sinclair Spectrum. Compatible with BBC A or B and any computer with parallel interface.

• Prints 12 characters per second • Elite type (12 characters per inch) • Bi-directional printing • Logic seeking • Plain paper – uses your letterheading • Up to A4 size paper • Instant change ink roller • 96 characters, full UK ASCII code • 80 columns • Separate power switch • On/off pilot lamp

FULL 12 MONTHS PARTS & LABOUR GUARANTEE.
FULL 21-DAY MONEY BACK GUARANTEE FOR MAIL ORDER CUSTOMERS.
CALLERS WELCOME.

CLASSIC COMPUTERS

A Division of Classic Typewriters Ltd.,
Established over 30 years
5/6 LANSDOWNE HOUSE, CHRISTCHURCH ROAD, BOURNEMOUTH. BH1 3JP. Tel: (0202) 23456

To: Classic Computers, 5/6 Lansdowne House, Christchurch Road, Bournemouth BH1 3JP.
Please supply:
.... Ibico LTR-1 letter quality printer £229.00
.... Printer cable for BBC A or B £17.95
.... Adaptor for Commodore 64 £29.95
.... Adaptor for Sinclair Spectrum £39.95
I enclose a cheque/P.O. for £.....
(Plus £3.50 for postage and packing)
Please debit my Access/Barclaycard Card: Expiry date .....
No: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
or telephone your credit card order

Name: .....
Address: .....
.....
.....
..... Post Code .....
Tel. No.: .....
YC1

Educational Software LCL

BBC Micro
ZX Spectrum
Commodore 64
Electron
unexpanded Vic
ZX81
Apple
PET
Dragon (book only)
All software for the above computers.

MICRO ENGLISH (BBC, Electron). Complete English Language self-tuition and revision course, to O-Level, of 24 programs. Includes "speak-and-spell" (no extras). £24.50.
MICRO MATHS 24 program revision or self-tuition course to O-Level. £24.50 (except ZX81 £12.00).
BRAINTEASERS (BBC, Electron, CBM 64, Spectrum, Dragon, Vic) Book of IQ tests & puzzle programs. £3.95.
ANIMATED ARITHMETIC Teaches using moving colour pictures (not words) Ages 3-8. £6.50 (disc £7.50).
MASTER MATHS (Apple, Pet and CBM 64 only). 50 program O-Level course or teacher's aid, amazing graphics. £90.
"... the programming standard is high". TIMES EDUCATIONAL SUPPLEMENT

Immediate dispatch Micro Maths, Micro English and Master Maths. Phone or send orders or requests for free catalogue (200 programs) to:
World leaders in educational software (distributors in 24 countries.)

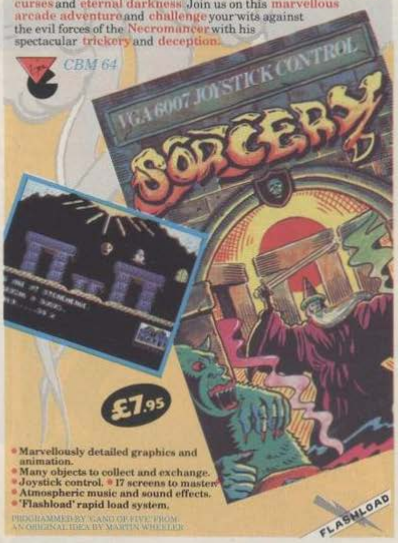
LCL
26 Avondale Ave.
Staines, Middx.
Tel: 0784 58771
24 hrs. Orders

Access VISA

GENEROUS TRADE DISCOUNTS

AS SEEN ON TV

Only by conquering **Stonehenge** can you free the world of the **evil curses** and **eternal darkness**. Join us on this **marvellous arcade adventure** and **challenge** your wits against the evil forces of the **Necromancer** with his spectacular **trickery** and **deception**.



- **Marvellously detailed graphics and animation.**
- **Many objects to collect and exchange.**
- **Joystick control. • 17 screens to master.**
- **Atmospheric music and sound effects.**
- **'Flashload' rapid load system.**

PROGRAMMED BY 'GAND OF FIVE' FROM AN ORIGINAL IDEA BY MARTIN WHEELER

FOR SPECTRUM 48K

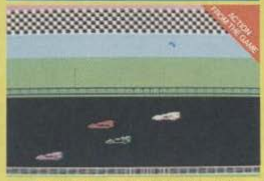
NEW!

A RANGE OF SOFTWARE SELECTED BY KEVIN TOMS

"Over the past few months many people have sent me the best software that they have written and asked me to publish it for them. I've picked the best of the best and they are available now from Silicon Joy"

Kevin Toms

GRAND PRIX MANAGER £6·95



"This excellent strategy game puts you in charge of a Grand Prix team and your task is to try and win the Team Championship."
Features: Race Action ★ Driver selection ★ Racing Car Engineering ★ Mechanics ★ Finances ★ Sponsorship problems ★ Crashes etc.

BOXING £5·95

"A 2 or more player Boxing game in which you fight your oponents with excellent on screen fight action. There is even a **World Championship league** included in the game!"

RUN-YOUR-OWN -LEAGUE Requires Printer £6·95

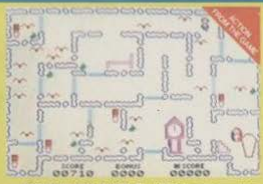
```
SCORES FOR FIXTURE WEEK 3
1  Addictive R.   v Stourvale A
                5  0
2  Corinthians    v Richmond Utd
                2  2
3  Wimborne W.    v Kings Arms
                2  1
4  AFC Spectrum   v Red Lion
                1  1
5  Poole OB       v Charminster
                3  0
```

"A very useful utility program which allows anyone to run a League with ease. This professional program is designed to be used for almost any sport or game and has many features." E.g. Up to 30 teams per division ★ Match cancellation/award ★ League Tables calculated ★ Variable points systems etc. etc.

TRIO — *3 quality games on one cassette for just £5.95 (under £1.99 each!)* — TRIO

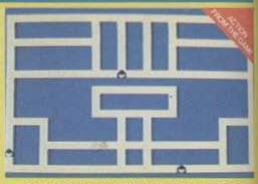
ASCOT – "an excellent horse racing gambling game with superb race graphics." Realistic odds and up to 6 players per season.

+



DRACULA'S CASTLE – "This is an amusing arcade game in which you must run around the castle to switch the lights on while avoiding the vampire bats. Beware of sleeping Dracula as lights wake him from his coffin. Can you survive till dawn!"

+



CHAOTIC CAVERNS – "A highly addictive maze chase game with 7 caverns. What really makes this game is that it requires a high degree of strategy to master it."

Look for the yellow packs in Software Stockists nationwide.

SILICON Joy

To order by mail *(p&p free)* send cheques/P.O.s to:

Silicon Joy, 7A Richmond Hill Bournemouth, Dorset BH2 6HE

Programmers We want your software. Send us a sample. If accepted, we will supply generous royalties plus free advice from Kevin himself!

A division of Addictive Games Ltd.

Educational Software For The Spectrum.

Educational tapes for infants right through to "O" level students.
Programs are designed so that they can be used many times, and include help facilities and explanations where appropriate.
Cassettes are packaged in full colour presentation boxes which include a helpful leaflet.
Two new tapes available in November-HIGHWAY CODE and "O" LEVEL PHYSICS.

Rose Software
148 Widney Lane, Solihull, West Midlands
B91 3LH. Tel: 021 - 705 2895

Please send me.....
£6.95 each (Includes P&P)
I enclose cheque/P.O. for £.....
Please send me a FREE brochure ☐
Name.....
Address.....
.....

Cut

only £6.95 ea (Includes P&P)

DACC Software Express DACC

	£
★★ **Commodore 64** ★★	
Beach Head (US Gold)	9.95
Monty Mole (Gremlin Graphics)	7.95
Daley Thompson's Decathlon (Ocean)	7.95
Arabian Knights (Interceptor)	6.95
International Soccer (CBM)	9.95
Dallas Quest (Disk) (US Gold)	9.95
Strip Poker (US Gold)	9.95
Solo Flight (US Gold)	14.95
747 Flight Simulator (DACC)	9.95
★★ **ZX-Spectrum** ★★	
Beach Head (US Gold)	9.95
Monty Mole (Gremlin Graphics)	6.95
Daley Thompson's Decathlon (Ocean)	6.90
Match Point (Psion)	7.95
Lords of Midnight (Beyond)	9.95
Sabre Wulf (Ultimate)	9.95
Solo Flight (US Gold)	9.95
747 Flight Simulator (DACC)	7.95
★★ **BBC Model/B** ★★	
Frak (Aardvark)	8.95
Blagger (Alligata)	7.95
Zalaga (Aardvark)	6.95
SPRITE-GEN (DACC)	17.95
Fortress (Pace)	8.95
Aviator (Acornsoft)	14.95
747 Flight Simulator (DACC)	9.95
★★ **Acorn Electron** ★★	
SPRITE-GEN (DACC)	9.95
747 Flight Simulator (DACC)	9.95
Space Rescue & Space Pilot Test (DACC) (two arcade games on one cassette)	6.95
★★ **Dragon 32/64** ★★	
747 Flight Simulator (DACC)	9.95
★★ **Computer Accessories** ★★	
★★ High quality PVC dust covers:–	
Commodore 64	each 2.95
ZX Spectrum	each 1.95
BBC Model/B	each 2.95
Acorn Electron	each 2.95
Dragon 32	each 2.95
★★ Blank C20 cassettes	five for 2.75
★★ Disks s/s s/d	each 1.95
★★ Disk storage box	each 1.95
★★ Flow-chart template	each 1.00

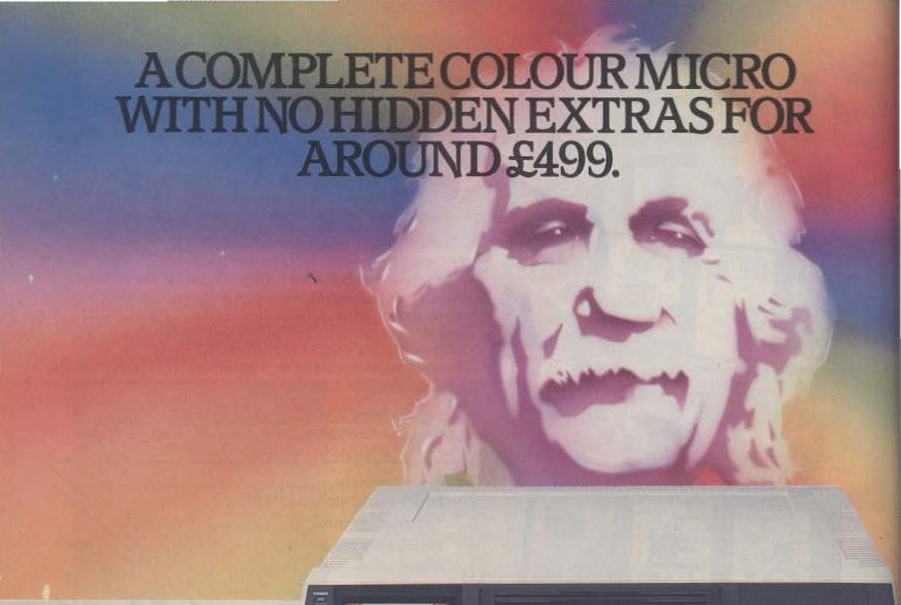
SPECIAL OFFER order three cassettes and recieve a PVC dust cover for your computer absolutely FREE.

All prices include VAT POST AND PACKING FREE!

All items in stock, despatched within 48 hours by first class post, order from:–

DACC Ltd.
(Dept YCO) 23 Waverley Road, Hindley, Wigan, Lancs WN2 3BN

A COMPLETE COLOUR MICRO WITH NO HIDDEN EXTRAS FOR AROUND £499.



The title of 'genius' is not bestowed lightly on man or machine: those extraordinary qualities and powers of intellect are rare.

Einstein had them in full measure. And so now does the new micro computer from Tatung, designed and built in Britain and appropriately named – Einstein.

Einstein was created by Tatung, one of the world's leading electronic companies, and given the capacity and the remarkable capabilities to compete with computers costing far more.

Its simplicity of operation will appeal to the first time buyer and to businessmen who don't want to lose staff to expensive and time-consuming training courses. At the same time its operating system is both powerful and sophisticated to satisfy the most advanced requirements.

For those who have outgrown their existing primitive machine, the speed and capacity of the 500K built-in disc drive will make all the difference. And for the small businessman, the ability to store and retrieve all information in seconds will be as important as Einstein's built-in flexibility, which allows the system to grow as the business develops.

BUILT-IN 80K MEMORY
Total memory capacity 80K RAM divided into 64K 'user' memory and 16K for colour graphics production.

BUILT-IN DISC DRIVE
500K 3" compact floppy disc drive. Potential for massive extra storage with a second 500K disc drive internally.

BUILT-IN 16 COLOUR GRAPHICS High resolution graphic animation from 32 sprites (definable shapes), 16 vivid colours.

BUILT-IN EXPANSION PORTS
Connection to both TV and optional colour monitor, most printers and other computers via RS232C interface. Also twin joystick ports, 8 bit user port, exclusive Tatung Pipe.

BUILT-IN FLEXIBILITY
Powerful Crystal BASIC. Multi-lingual plus ability to run CP/M.†

BUILT-IN VERSATILE SOUND
Sound synthesiser facility includes chromatic music with three voices. Substantial speaker with volume control. Provision for speech synthesiser.

Einstein has them all. Feature for feature, it meets the needs of the novice and the experienced operator, both at home and in the office.

Einstein, designed and built in Britain, is a complete colour micro computer with no hidden extras.

And for under £500 is sheer genius.

TATUNG
Einstein

SHEER GENIUS: AT WORK, AT HOME

DIAL 100 AND ASK FOR FREEFONE EINSTEIN FOR YOUR NEAREST STOCKIST.

†CP/M is a trade mark of Digital Research I

From

GILSOFT

The Welsh Wizards of Adventure

THE QUILL
ADVENTURE WRITER
FOR THE
SPECTRUM 48K
AND
COMMODORE 64

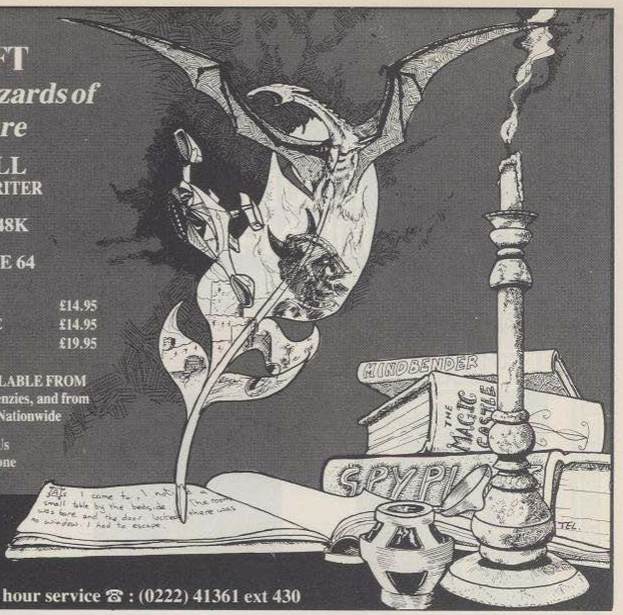
48K SPECTRUM CASSETTE	£14.95
COMMODORE 64 CASSETTE	£14.95
COMMODORE 64 DISK	£19.95

SELECTED TITLES AVAILABLE FROM
W.H. Smith, Boots, John Menzies, and from
Good Computer Shops Nationwide

Or Direct From Us
By Post or Telephone

GILSOFT
30 Hawthorn Road
Barry
South Glamorgan
☎: (0446) 732765

Credit Card Order Line 24 hour service ☎ : (0222) 41361 ext 430



SKC®

PERFECTION ASSURED
FLOPPY DISK MEET ANSI, DIN, ECMA, IBM, JIS AND SHUGART SPECIFICATIONS.

MINI FLOPPY DISK
EVERY DISK IS CERTIFIED AND GUARANTEED TO BE 100% ERROR FREE.

ALL THESE PRICES INCLUDE VAT.

LOW PRICE — HIGH QUALITY

BOXES OF 10 DISKS

40 TRACK
S/S S/D £12.00
S/S D/D £12.60
D/S D/D £14.80

80 TRACK
S/S D/D £14.70
D/S D/D £18.40

ADD £1 POST AND PACKING

ALSO COMPUTER CASSETTES
BOXES OF 100

C10 ..... £26.50
C15 ..... £27.50
C20 ..... £28.75

ADD £3.50 CARRIAGE

P.V.TUBES
Dept. D
104 ABBEY STREET, ACCRINGTON, LANCS BB5 1EE.
Tel: (0245) 36521. (0254) 32611
Telex: 635562 Griffin G for PV

Phone in Access/Visa card no. for same day dispatch

SPECTRUM 48K
VGC 1019

"...Dare you accept this mission?"...

- A massive arcade adventure with a wealth of incredible graphics.
- Game Save facility.
- Flashload rapid loading system.
- 240 uniquely detailed locations, many of which contain hidden surprises and ingredients necessary to complete the game.
- Key control selection.
- Interactive robots.
- Pick up/use object facility.

"Strangeloop is unique, graphically impressive, vast, and devious; in short, brilliant. Not only all this, but it's cheap too." Popular Computing Weekly 5.9.84

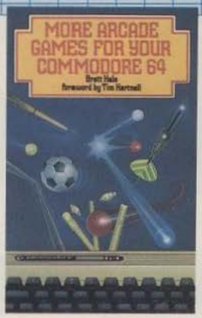
Programmed by Charles Goodwin.

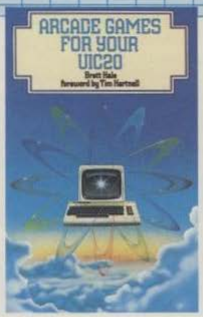
£5.95

...not days, not weeks but MONTHS of enjoyment...

STOP!

YOU OWN A COMMODORE 64 OR VIC 20, BUT ARE YOU MAKING THE MOST OF IT?





YOU SOON WILL BE, WITH ONE OF THESE BOOKS FROM CORGI/ADDISON-WESLEY!

Each one is packed with a stunning array of arcade games, enabling you to explore the full power and potential of your micro.

* All the games are in BASIC, so you can modify them however you want
* Each one is listed twice – once for keyboard use, and once for use with a joystick

A DAZZLING SELECTION OF GAMES AWAIT YOU!

CORGI/ADDISON-WESLEY
TOGETHER,
THE NEW FORCE IN COMPUTER BOOK PUBLISHING

All these books are available at your bookshop, though should you find any difficulty in obtaining them, they can be ordered direct from the publisher. Simply fill in the form below.

Please send me

____99124 4 Arcade Games for your Vic 20 at £4.95 (128 pages)
____99125 2 Arcade Games for your Commodore 64 at £4.95 (128 pages)
____99127 9 More Arcade Games for your Commodore 64 at £4.95 (128 pages)

Please allow cost of book(s) plus 30p for one book plus 15p for each additional book for postage and packing.

I enclose my cheque/postal order for £_____
payable to: TRANSWORLD PUBLISHERS LTD.

(IN BLOCK CAPITALS PLEASE)

Signed_____ Date_____

Name_____

Address_____

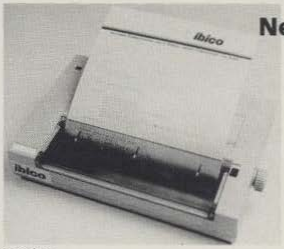
_____

Now send to CORGI/ADDISON-WESLEY BOOKS,
61-63 Uxbridge Road, London W5 5SA

(A)

COMPUTERBASE

only £199.00 (+ VAT)



IBICO'S New Letter Quality Printer Model LTR-1

Professional standards at your fingertips for letters, lists, files, addresses etc.

- ☆ Compact 292 x 57 x 165mm
- ☆ Takes full A4 sheet
- ☆ Continuous or manual feed
- ☆ Elite type 12 pitch
- ☆ Parallel and serial interface
- ☆ 80 Columns
- ☆ 96 characters
- ☆ 12 CPS Bi-directional

ALSO AVAILABLE –
Optional adaptors for:
Sinclair Spectrum
Commodore 64
Standard parallel printer cable

Computerbase Dept YC1, 21 Market Avenue, City Centre, Plymouth PL1 1PG

Computerbase Dept YC1, 21 Market Avenue, City Centre, Plymouth PL1 1PG

Please supply:
..... Ibico Printers
..... Adaptor for Commodore 64
..... Adaptor for Sinclair Spectrum
..... Parallel Printer Cable to fit ..... Computer (state computer make)
I enclose a cheque or Postal Order for ..... made payable to Computerbase or
debit my Access/Barclaycard/Diner: Expiry date.....
Account No .....
Name .....
Delivery address .....

Price per unit	
£199.00	
£21.70	
£34.74	
£8.65	
£5 P & P	£5
Vat @ 15%	
Grand Total	

BETA BASIC 1.8

ENHANCED BASIC FOR SPECTRUM 48K FOR GRAPHICS – STRUCTURED PROGRAMMING – DATA HANDLING

Release 1.8 is more powerful than ever! We don't have space to do this program justice — if you can't believe the ad, send us a large S.A.E. for further information.

Features: Commands are single-entry keywords in graphics mode. Syntax is checked on entry. Fully compatible with Spectrum Basic. Microdrive compatible. Comprehensive manual.
NOTE: Release 1.0 is still available for 16/48K Spectrum at £11.00.

ALTER screens colours (general or specific)
AUTO line numbering
CLOCK set/read clock
CLOCK digital clock
CURSOR CONTROL CODES allow strings to have complex shapes
DEF KEY user definable keys
DELETE a block of lines
DO-LOOP structure
EDIT specified line
ELSE (used with IF ... THEN)
EXIT leave DO-LOOP
FILL enclosed area with specified ink or paper
GET wait for keypress
JOIN two program lines
KEYIN a string
KEYWORDS new keywords on/off
LIST/LLIST line TO line
USED (used with GOTO, GOSUB)
ON ERROR trap errors (with LINE, STAT and ERROR)
PLOT a string (may contain cursor control codes)
POKE a string
PROC call procedure
PROC, DEF PROC, END PROC (for named procedures)
RENUM versatile renumber
ROLL all or part of screen in any direction by specified number of pixels, with or without attributes
SCROLL like ROLL, but without wrap-round
SORT arrays (very fast)
SPLIT program lines
TRACE program execution
UNTIL used with DO or LOOP
USING used with PRINT
WHILE used with DO or LOOP
XOR, YOR move PLOT origin
XRG, YRG change PLOT scale

FUNCTIONS

AND (bit-by-bit)
BIN$ decimal to binary
CHAR$ number to 2 characters
CODE first codeno
DEC hexadecimal to decimal
DVER double PEEK
FILLED filled area
HEX$ decimal to hexadecimal
INSTR$ string search
MEM free memory
MEMORY$ all of memory as a string
MOD modulus
NUMBER 2 characters to number
OR (bit-by-bit)
RND(M) fast RND
SCRN$ recognises user graphics
SINE fast sine
STRING$ repeats strings
TIME$ current time
USING$ formats numbers
XOR (bit-by-bit)

Only £11.00 inclusive! (Upgrade price for Release 1.0 owners is £4.00. This includes a 12-page supplement to your manual. Please quote date of purchase. If you did not purchase from us, state supplier and return original cassette.)

Please send me:
Beta Basic, Release 1.8. Payment of £11.00 is enclosed.
(or £11.50 for foreign orders). Cheques payable to BETASOFT.

I don't believe it! Please send me full details of Beta Basic 1.8. I enclose a stamped addressed envelope.

NAME: .....

ADDRESS .....

.....

BETASOFT
92 OXFORD ROAD, MOSELEY,
BIRMINGHAM B13 9SQ.

The Key To Success!

Now, with the new Stonechip Spectrum Keyboard, the user has no worry of damaging the Spectrum itself as improved designing enables it to fit the case perfectly.

Assembling the case is simple as it consists of two halves, the top half containing the keyboard, with a small printed circuit board, attached by ribbon cable, plugging into the rear of the Spectrum. The lower half fits precisely around the Spectrum, thus preventing any risk of damaging through movement.

Your Sinclair guarantee need not be invalidated since the Spectrum does not require removal from its case.

THE MAIN FEATURES OF THE KEYBOARD ARE:

- No modifications to Spectrum necessary as it connects via rear port.
- Full-length space bar.
- Built-in 'Echo' amplifier and tape interface.
- RESET keys remove the need to disconnect power supply lead.
- Single key 'DELETE'.
- Single key 'Extended Mode' selection (ie one key replaces the CAPS SHIFT and SYMBOL SHIFT function).
- Fully compatible with Interface 1 and most peripherals.

STONECHIP ELECTRONICS

Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants. Telephone: (0252) 333361

Extender unit available to use with Interface 2 and Kempston Joystick Interface. £2.50.

£59·95

DEALER ENQUIRIES WELCOME
Delivery approximately 28 days

To: Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants. Telephone: (0252) 333361

Please forward me the following products:

.....

.....

All prices are inclusive of VAT, Post & Packing for U.K. deliveries (overseas add 15%)

Name .....

Address .....

.....

Please debit my Access Card Number

I enclose Cheque/PO for £

Twin Kingdom Valley

48k Spectrum

BUG-BYTE

You really can't go wrong with any Level 9 game as they are really brilliant

CRASH MICRO SEPT '84.

"Whichever machine you own, if you have the vaguest tendency towards adventure playing then you must try one of these games (unfortunately you'll probably end up wanting to buy the lot!)"

Computing Today, August 84

"To me, all Level 9 adventures create a remarkable atmosphere because the descriptions sound so life-like. This is where so many other adventures fail."

Crash, July 84

"But it's not just the size of the game it's the quality as well that is astonishing ... — seems to fire the imagination."

PCG, April 84

"As in all Level 9's adventures, the real pleasure comes not from scoring points but in exploring the world in which the game is set and learning about its denizens."

Which Micro?, February 84

"(LORDS OF TIME). As we have come to expect from Level 9, the program is executed with wonderful style ... Highly recommended."

PCW, 1 February 84

"I thoroughly recommend these Adventures, they are excellent value for money. No self-respecting Adventure-addict should be without them. I believe Level 9 are producing a series of Adventures which should be regarded as classics."

Atari User, July 84

"These programs run very fast and there are no frustrating pauses. Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Adventure is nothing short of brilliance: rush out and buy it. While you're at it buy their others too. Simply smashing!"

Your 64, June 84

"Level 9 — arguably the producer of the best adventure games in the UK — has done it again. LORDS OF TIME is a sparkling addition to its stable of winners."

Acorn User, July 84

"(SNOWBALL). This is another imaginative, massive-scaled immensely enjoyable adventure from those experts down at Level 9 Computing."

Your Computer, March 84

Level 9's epic adventures are now here for the AMSTRAD. Disk versions are available for the BBC (40/80 track) and Commodore 64. And, best of all, RETURN TO EDEN is ready. It's been a busy month!

RETURN TO EDEN is the long-awaited sequel to Level 9's top-selling Snowball adventure. Now it's here with 220 locations, masses of puzzles, and with pictures on the CBM and Spectrum versions.

NEW

	Cassette £9.95	Disk £11.95
1. **COLOSSAL ADVENTURE.** The classic mainframe game with 70 bonus rooms.	☐	☐
2. **ADVENTURE QUEST.** An epic journey through Middle Earth.	☐	☐
3. **DUNGEON ADVENTURE.** A massive game which completes the Middle Earth Triology.	☐	☐
4. **SNOWBALL.** Save the interstar freezer, Snowball 9, in a huge space adventure with over 7000 locations.	☐	☐
5. **RETURN TO EDEN.** SF adventure on the weirdest planet ever. The sequel to Snowball, though you don't need to have played this.	☐	☐
7. **LORDS OF TIME.** A humorous romp through World History.	☐	☐

I ENCLOSE A CHEQUE/PO FOR £9.
EACH (CASSETTE) OR £11.95 EACH
(DISK) FOR BBC OR CBM 64

My name: .....

My address: .....

.....

.....

My micro is a: .....

(one of those listed below, with at least 32K of memory).

Contact:

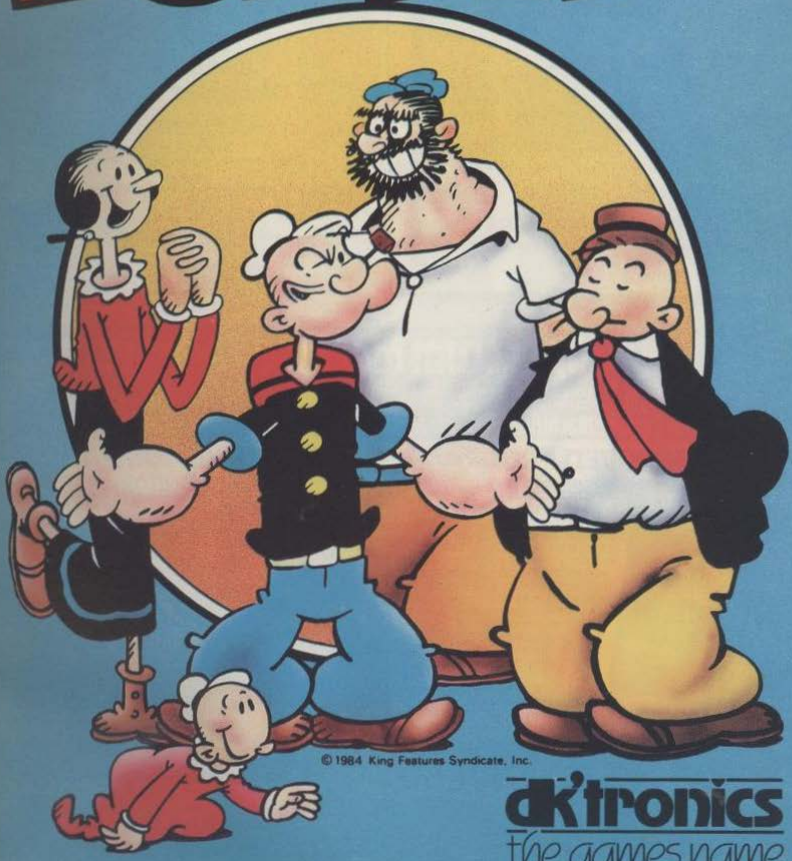
LEVEL 9 COMPUTING

Dept. , 229, Hughenden Ro
High Wycombe, Bucks. HP13 5F

Available from W H Smith and good computer shops everywhere. If your local dealer doesn't stock Level 9 adventures yet, get him to contact us or: Centresoft, Microdealer UK, Ferranti & Craig, Leisuresoft, Lime Tree, LVL, PCS, R & R or Wonderbridge.

AMSTRAD BBC CBM64 SPECTRUM MTX ORIC 1 LYNX NASCOM ATARI

POPEYE®



© 1984 King Features Syndicate, Inc.

dk'tronics
the games name

Ring for sample Printout, Full Spec and latest Price

PRINTER BARGAINS

STAR DP 8480 (RS232) 197 ... £187.00 INC VAT
STAR GEMINI 10X ..... £235.00 INC VAT
STAR GEMINI 15X ..... £380.00 INC VAT
STAR DELTA 10 ..... £358.00 INC VAT
JUKI 6100 ..... £380.00 INC VAT
CANON PW1080A ..... £320.00 INC VAT

Securicor delivery £8.00

CJE Micros BBC Printer Packs for Star, Canon & Juki Printers.

Include 1. the Printer. 2. Delivery by Securicor.
3. Cable to the BBC 1-3 Meters.
4. Screen Dump Program (M/C Source).
5. Text Dump Program.
6. Function Key Set Up Program, for use with word wise.
7. Function Key Label Printing Program for use with above.
8. View Printer Driver.
9. 100 Sheets of Paper.
10. A Mains Plug with a 3 amp plug.
11. Booklet giving details of using the Printer with a BBC.

PRINTER PACK PRICE .....Printer Price + £20.00

CJE Printer Packs for other Micros include – Printer Cable, Paper, Mains Plug & Delivery.

BBC Model B.....£399.00
BBC Model B + DI £469.00
ELECTRON.....£199.00

Phone Credit card orders welcome

CJE MICROCOMPUTERS
Dept YC, 78 Brighton Rd, Worthing, West Sussex.
(0903) 213900

TYKES!

It's all in Headingley at

The Super Computer Shop

We stock HARDWARE
Computers, disk drives, printers, monitors, disks, tapes, paper, accessories.

and SOFTWARE
Utilities, adventures, education, business, games.

FROM
Acorn, Amstrad, Commodore, Microwriter, Sinclair.

FOR
Access, Amex, Barclaycard, Diners, Cheques, even pound coins.

You're welcome to come in and browse, and remember, you're better off at a proper computershop.

flexiwords computershop
18 Otley Road Leeds LS6 2AD
(0532) 758474

The Key to Spectrum Machine Code Success.

Picturesque's MACHINE CODE SYSTEM is used and recommended by professional software writers, yet the excellent documentation and the friendly, easy-to-use programs have been highly recommended for beginners.

You will only buy one Machine Code System, so buy the best, the one the professionals use.

NEW IMPROVED PROGRAMS — MICRODRIVE COMPATIBLE

ASSEMBLER

Completely self-contained with its own line editor, giving an easy-to-read 40 column tabulated listing. Auto line numbering, line renumbering and auto tabulation make this one of the fastest and easiest Assemblers to use. 5-character label names. Decimal, Hex or ASCII constants. SAVE/LOAD/VERIFY both the listing and Machine Code to cassette/MICRODRIVE/NETWORK. Assemble from cassette or Microdrive into memory for very large programs. Customise to most Centronics printer interfaces, or RS232 (with Interface 1) for 80 column printout. FAST ASSEMBLY — 1k of code in 7 seconds. Assembler Directives:— ORG, END, DEFB, DEFW, DEFM, EQU, DEFL. (Microdrive and Centronics facilities only operate with 48K machines.)

£8.50
INCL. VAT & P&P.

MONITOR

The ideal tool to help the beginner get started, yet it contains all the commands for the experienced programmer to run and de-bug machine code programs. Inspect and alter memory contents in Hex or ASCII. Breakpoints and full Register display. NOW WITH SINGLE STEPPING through RAM or ROM. Disassemble any part of memory, RAM or ROM. Dec-Hex-Dec number converter. Printer output to ZX printer or via RS232 (with Interface 1) or customise to most Centronics printer interfaces. General memory management commands include Hex dump, Insert, Delete, Fill and Move. Can reside in memory with the Assembler (48K machines only) to give a complete Machine Code programming system.

£7.50
INCL. VAT & P&P.

Programs supplied on cassette with option to Save onto Microdrive (cartridge not supplied)

Existing owners can obtain the new programs by returning the **cassette only** to Picturesque, along with a cheque/PO for **£1.50 per program** (inc. VAT & P&P). New cassettes will be supplied by return of post.

Available from the "SPECTRUM" chain of stores, branches of John Menzies and all good computer shops, or by mail order by sending cheque/PO to:
PICTURESQUE, 6 Corkscrew Hill, West Wickham, Kent, BR4 9BB. Send SAE for details.

PICTURESQUE
PICTURESQUE
PICTURESQUE
PICTURESQUE

ANIROG
TURBO 64
COMMODORE
Also available on Disk
Space Pilot
Zodiac
Minipedes
BONGO
Flight Path 737
KONG
MINIKRON
DEFENDER
SPECGRAF
COMMODORE 64
VIC 20 16K
VIC 20
AMSTRAD
MSX
UTILITIES
GAS KIT 64
TRADE ENQUIRIES ANIROG SOFTWARE LTD. 29 WEST HILL DARTFORD KENT (0322) 92513/8
MAIL ORDER 8 HIGH STREET HORLEY SURREY 24 HOUR CREDIT CARD SALES HORLEY (02334) 6083
PAYMENT BY CHEQUE P.O. ACCESS/VISA 50p POSTAGE & PACKAGING

FROM THE SOURCE OF NEW IDEAS

English Software presents 5 original games.

PROGRAMMED HERE IN THE U.K.

1 JET-BOOT JACK™

Commodore 64, BBC Model B/Acorn Electron, Amstrad CPC464: **£7.95** each Cassette

Atari 400/800 and XL Models 32K: **£9.95** (Cassette and Disc)

Electron version is joystick interface compatible

2 Witch Switch

Commodore 64: Cassette

£8.95

3 Legend of the Knucker-Hole

Commodore 64: Cassette (Release Date – December) **£9.95**

4 HOME SWEET HOME

starring little HENRY

Commodore 64: Cassette:

£8.95

5 Soldier of Fortune

Commodore 64: Cassette **£7.95**

ALL COMMODORE 64 CASSETTES ARE SUPPLIED ON PAVLODA ULTRA-FAST LOAD.

JET-BOOT JACK THE REVIEWERS' CHOICE!

"Excellent throughout – a likely chart topper" 100% Rating (5 stars)
PERSONAL COMPUTER NEWS

"Excellent game with beautifully coloured and defined graphics"
WHICH MICRO?

"This game is excellent – Jack looked almost human!"
GAMES COMPUTING

"Arcade standard – should please most addicts" (5 Star Rating)
HOME COMPUTING WEEKLY

"In short, a first rate game"
TV GAMER

"Jet-Boot Jack is a gem!"
COMPUTER AND VIDEO GAMES

"This has to be one of the best, most playable and carefully thought out games for the Atari that I've seen for a while"
PERSONAL COMPUTER NEWS

What more can WE say!?!?!?

PROGRAMMERS WANTED

We're always on the lookout for new programmers. If you can work to the English Software standard of quality, we'll reward you by marketing your programs across Europe and USA! Contact us today.

ENGLISH™ SOFTWARE

THE POWER OF EXCITEMENT

The English Software Company, Box 43, Manchester M60 3AD
Trade Enquiries Tel: 061 835 1358.

At last, the first joystick that puts the firing button where it should have been in the first place.

TRIGA COMMAND

IS HERE!

THE TOP AMERICAN JOYSTICK IS NOW AVAILABLE IN THE U.K. . . .

To fit your SPECTRUM
ONLY £19.99 + £1.50 P+P

- *Including Interface to plug straight into the Spectrum.*
- *The first Joystick to give you "Arcade" feel and control.*
- *"Jet Style" heavy duty, diamond cut grip.*
- *Fire Trigger placed under your index finger . . . the finger with the fastest reflex action. • Self centreing, 360° action.*
- *Compatible with most of the latest Software (Kempton system).*

Also available for Commodore/Atari/BBC/

NEW NEW NEW NEW ONLY **£29.99**

SPEECH SYNTHESIZER WITH BUILT IN JOYSTICK INTERFACE FOR THE SPECTRUM

• Simply plug into an exciting new world of computer speech synthesis. • Latest State of the Art Electronics. • Uses the Allophone system. • Produces any word or phrase from an unlimited vocabulary. • Speaks directly through TV speaker. • Also Amplifies Spectrums own sound through TV speaker! • Built in Joystick Interface accepts any Atari type joystick for full games control. (Kempston compatible). • Complete with Demo Cassette. • Full Instructions.

NOW for the Commodore 64 The COMMVERSA SPEECH SYNTHESISER CARTRIDGE

£24.99 + £1.50 P+P
PRICE BREAKTHROUGH.

• Simply plug into the exciting world of Speech Synthesis. • The Commversa has an unlimited vocabulary using the now standard Allophone System. • Programming is so easy and sentences can be made up in minutes! • Comes complete with full instructions + Free Demo Tape. No extras required.

☐ Triga Command Spectrum	£19.99
☐ Triga Command Atari	£9.95
☐ Triga Command Commodore	£12.99
☐ Triga Command BBC	£19.99
☐ Vox Box, Spectrum	£29.99
☐ Vox Box and Triga Command	£39.99
☐ Commversa Commodore 64	£24.99

Postage Please Add £1.50
TRADE ENQUIRIES WELCOME

24 HR CREDIT CARD LINE

ALLOW 7 DAYS

DATEL ELECTRONICS
UNIT 8, FENTON INDUSTRIAL ESTATE, DEWSBURY ROAD, FENTON, STOKE-ON-TRENT
TEL: 0782 273815

COMCON

Programmable Joystick Interface for the Spectrum

£19.95
incl. VAT and P & P

Simple and fast programming. Plug the six function connectors into the required Spectrum key positions — Ready!

Two independent fire actions Photon Blasters and Neutron Bombs at the touch of your fingertips.

Extension port for Currah Microspeech unit. Combine joystick with sound and speech for ultimate arcade action.

Compatible with all Atari type joysticks including Quickshot II (without rapid fire action).

Interface operates joystick parallel to keyboard. Joystick action compatible with any add-ons including Microdrives.

QUICKSHOT 2+2 JOYSTICK
modified to incorporate 2 independent fire actions and no rapid fire option
£13.95 incl. VAT and P & P

FLIGHTLINK JOYSTICK
with 2 independent fire actions
£10.50 incl. VAT and P & P

CURRAH µSPEECH UNIT
fits into COMCON extension slot
£29.95 incl. VAT and P & P

Dealer Enquiries Welcome
Phone Ludlow (0584) 4894

Send to:

ALSO AVAILABLE FROM SELECTED RETAIL OUTLETS

FREL LTD.

Hockeys Mill, Temeside, Ludlow, Shropshire SY8 1PD

Mr/Mrs/Miss _____

Address _____

_____ Postcode _____

Qty	Code	Item	Item Price	Total £
	01	Comcon Interface	@ £19.95	
	02	Flightlink Joystick	@ £10.50	
	03	Quickshot 2+2 Joystick	@ £13.95	
	04	Comcon + Quickshot 2+2	@ £31.90	
	05	Comcon + Flightlink	@ £28.45	
	06	Currah µSpeech unit	@ £29.95	

I enclose a cheque/postal order made payable to FREL LTD for: £

COMCON

YOUR COMPUTER CLASSIFIED

01-661 3036

Contact: Lucy O'Sullivan

ADVERTISEMENT RATES

Lineage: 50p per word (Min 20 words)
Box No: £4.00 extra
Linage advertisements are prepayable and the order form published in this section should be completed and returned with remittance. Credit Card facilities are available.

Display — rates per scc (Min. 2scc)

One insertion	:	£9.00
Three insertions	:	£8.70
Six insertions	:	£8.50
Twelve insertions	:	£8.00

Display advertisers should preferably reserve space by phone.

Copy Date

Closing date for Classified advertisements is the 26th Nov. for the Jan. edition.

Post to
Your Computer, Classified Department, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Britain's Biggest Selling Home Computer Magazine

HOME ACCOUNTS

Put your house in order! Probably the best home use for your computer! Comprehensive coverage of bank accounts, credit cards, HP, etc. Inbuilt accuracy check for all transactions. Project cashflow for any period ahead. Available for CBM 64 or Vic-20. £7.50 or free details from:

DISCUS SOFTWARE
FREEPOST, Windmill Hill
Brixham TQ5 9BR
Tel: 080 45 55532

MICRODRIVE TRANSFER TAPE

At last **MAJORITY** of your software can be transferred to Microdrive, even auto-start commercially made games **WILL** run as intended.

* The **NEW 007 MD** cassette enables you to transfer the Headerless programs as well.

* Includes an intelligent Header Reader which tells **YOU** if any special actions required.

* Does **NOT** require an additional Help tape.

* Semi-Automatic. Fully automatic systems have proved limited.

How it works: Copies Code to the Microdrive using its push-button copier. **YOU** make a few very easy changes to the Basic loader part. Save it to Microdrive, and magic, **INSTANT SUCCESS.**

007 MD IS JUST £5.95
(Europe + 50p Other areas + £1.50)

SPECIAL OFFER: Membership of the **MICRODRIVE EXCHANGE** Newsletter club plus 007 MD for just £10. (Or on cartridge for £15).

ZX-GUARANTEED (Dept YC)
29 Chadderton Drive, Unsworth,
Bury, Lancs. BL9 8NE
Tel: 061-766 5712

Spectrum Repairs

£16.95 inclusive of labour, parts, p&p etc. ZX81 for £11. Fast reliable service. (Av. repair 24 hrs) by qualified engineers. Send computer only to:
HS COMPUTER SERVICES
2 The Orchard, Warton, Preston, Lancs.
PR4 1BE. Tel. 0772 632686 or 634897

COMMODORE 64

R.B.S.
(Rapid Backup System)
Convert your single and multipart tape programs to turbo-load, faster than the Commodore disc drive. Each converted program will load independently of R.B.S. No pokes, no Sys. Calls, No User Knowledge required. Load "The Hobbit" in 120 secs. for personal use only. Cassette £7.50 inc.

Hypersave — 64
A versatile and flexible fast-loading utility. 8 additional basic commands. Save/Load/Verify up to 48K continuous RAM at Hyperspeed. Cassette £7.50 inc.

Backup — Deluxe
A powerful and user friendly security backup utility. Load/save all program parts continuously. Incorporates a sophisticated header-reader. For personal use only. Cassette £3.50 inc.

Pro — Sprite
Sprite library. Design, manipulate, catalogue multi and single colour sprites. Create data, Joystick control. Packed with features. 100% machine code. Cassette £7.50 inc. Complete with your first Sprite library.
Special Discount: Any two programs £9.99. All four £19.00 plus free! secrets! I/O guide with every order.

Cheque/P.O. or SAE to:
DOSOFT
2 OAKMOOR AVENUE
BLACKPOOL FY2 0EE

FAST DESPATCH GUARANTEED

THE TRIAL OF ARNOLD BLACKWOOD
A New adventure of intrigue for the **AMSTRAD 64**
(also available for DRAGON 32) £5.50 inc. (state micro)
NEMESIS
10 Carlow Road, Ringstead, Kettering, Northants NN14 4DW.

ORIGINAL programs urgently needed Oric and Commodore 64. Educational or Games. Cash payment or royalties. Professional ethics strictly adhered too. Send your program for consideration. Knight Products (UK) Ltd., 71 Colne Road, Earby, Lancashire BB8 6XL.

257

MICRO ARTS
Magazine and Software

"A forum organisation for people interested in high-tech art and related areas."
"Magazine: issue one — "Language"; What is Computer Art?; Language as Virus; Electronic Beowulf; Music; Graphics; Film; Video; more. Issue two - "Sex"; Sectech — Sensuality and Technology; Programmer as Onanist; Music 2; Systems Music; Random Soul; More for November.

Direct 90p per issue incl. post.
Software Spectrum 16×8K (specify)
MA1—Abstract originals (8 menu controlled graphics) £2.50.
Mag various unusual events £1.95.
BBC Model 'B': MA3; Martin Rootes Graphics — £3.00.

MICRO ARTS
PO Box Box 567, London SW4 9PH
Tel. (01) 720 4456

TAPE COPIERS

Unique machine code programs to allow security, back-up copies of the majority of protected software. Please state for:

COMMODORE 64	£5.95	ORIC 1	£5.95
VIC 20 (—8—)	£5.95	ATARI (—C2—)	£5.95
SPECTRUM	£5.95	BBC	£5.95
ELECTRON	£5.95	(Handles Locked Files and Fixed Baud Rate)	

ALL APPROPRIATE INSTRUCTIONS

HIGH SPEED BACK-UP

commodore

COMMODORE 64 owners, at last the long wait is over—**FASTBACK** turns your software by TURBO LOAD—creates fast loading copies of most programs (single and multi part) that run independently of the utility. For example: The Hobbit' loads in 150 seconds with **FASTBACK**.
Supplied on tape with full instructions
— ONLY **£9.95**

AMSTRAD

SPEEDMASTER is here. Allows choice of save speed. Creates fast loading copies of all software tested.
ONLY **£7.95**

TAPE TO DISK TRANSFER UTILITIES

Transfer games etc. to disk. Supplied on tape with full instructions for —

BBC	£9.95
ATARI (All models)	£9.95
COMMODORE 64 NEW IMPROVED VERSION	£9.95

DISCO
No user knowledge required.
We guarantee this is the best available.
Still only £9.95
All prices include VAT.
Post & Packing. Cheques, P.O. or Phone your Card Number to:

EVESHAM MICRO CENTRE
Bridge St, Evesham, Worcestershire
Tel: 0386 49641
NEW SHOP NOW OPEN - Minos Centre, 1758 Pershore Rd, Cotteridge, Birmingham Tel: 021-458-4544
TRADE AND QUANTITY ORDERS WELCOME

BLANK CASSETTES

Rely on the professionals for guaranteed top quality computer/audio cassettes at great value budget prices. Packed in boxes of 10, complete with labels, inlay cards and library case.

Prices include VAT, post & packing

Length	Box Price (10)	Qty.	Value
5 mins (c.5)	£4.35		
10 mins (c.10)	£4.40		
12 mins (c.12)	£4.45		
15 mins (c.15)	£4.50		
30 mins (c.30)	£4.70		
60 mins (c.60)	£5.30		
90 mins (c.90)	£7.00		

£

Cheque Postal Order enclosed for

TRADE ENQUIRIES WELCOME. GET BEST TERMS. SERVICE & PRODUCT. BUY DIRECT FROM MANUFACTURERS OF **PROFESSIONAL** BRAND CASSETTES.

NAME .....

ADDRESS .....

PROFESSIONAL MAGNETICS LTD
(Dept. CCO), Cassette House, 329 Hunslet Road, Leeds LS10 3YY
FREEPOST Tel: (0532) 706066

DISKount PRICES

5¼" SS/DD Diskettes	£1.50
3½" SS/SD Diskettes	£4.50
2000 Sheets (11"×3½") Listing Paper (11"×3")	£16.00

CASSETTES: C15 50p
C20 60p C30 70p
(Case/Labels Inclusive)

* 1 Year Guarantee
* p&p free: Delivery 7 days
* Further discounts available
* We supply schools & colleges

Cheques/P.O.'s to:
C & S Computer Services
144 Sutcliffe Avenue, Grimsby
Sth Humbs. DN33 1AP.

THE BAT CAVE
SPECTUM 48K

Escape from building and its inmates! Tacky horror, humour, skill levels, hi-score and lots of locations to test your survival skills. Two different versions on same tape. £6.00. Send cheque/PO to: Augen Blick, 89 Teesdale Avenue, Birmingham B34 6JQ.

ARROW MICRO SERVICES
– Commodore 64 –

ARROW TURBO-SAVER
Fed up with waiting for those programs to load? If you need turbo-saver, easy to use, multi-speed, reliable, with disk drive programs reload independent of turbo-saver.....£7.00

ARROW DISKSPY
This selective disk copier will copy, back-up and you don't need to copy all the disk, very user friendly and easy to use.....£7.00

ARROW TRANSFER
Transfer your favourite games to disk both full or part and auto runs works with most software.....£7.00

ARROW DISCDOCTOR
Rescue your scratched files easily edit any byte on any block in disk of Adpodder programs edit the directory format disks.....£8.00

ARROW MICRO SERVICES
20 Portmeadow Walk
London SE2

THE PUNTER'S PAL COLLECTION
Starters Orders – A simple to use horse race predictor. Producing 67% success rate on top-tips. Suitable for both National Hunt or Flat races. On each predicted horse an easy to understand rating is given.
Controlled tests have shown that the program consistently beats ANY tipster in ANY newspaper. Simply enter form from any Daily Newspaper. Now with dual and straight forecasts, and trixants. The least expensive such program on the market at only £6 inc. p&p.
Also HARE'S RUNNING – as with Starter's Orders but for use with greyhound racing for £6.
BUY BOTH PROGRAMS FOR £10.
Both programs are available for any Spectrum or Commodore 64. *(please state which).*
Orders to: **David Jackson, 1 Osborne Place, Todmorden, Lancs. OL14 5BQ.**
(Or send SAE for more details)

MAKE YOUR OWN TV MOVIES
using
SPECTRUM 48K PROGRAM

Tape your movies and play back to amuse friends. ZX-81 and Spectrum morse-code reading progs.

for details:
PINEHURST DATA STUDIOS
69 Pinehurst Park. W. Moors
Wimborne, Dorset BH22 0BP

AMSTRAD COMPUTER DUST COVERS

Made in one piece, from matching proofed anti-static nylon. Piped in green with Amstrad CPC 464, printed keyboard section £6.95. State mono or colour.

BBD Covers
39 Manse Ave.,
Wrightington, WN6 9RP.

Discount Software

Spectrum-Commodore-Vic 20-ZX81
Spectrum-Manic Miner, Pool £4.95 each. CBM-Egbert, Condor, Everest £4.75 each. Vic-Invader, Get Lost, Logrun £3.40. ZX-Brickstop, Breakout, Othello £2.00. Many more send SAE for latest list. Cheque PO to: **A. J. Wilkins (Software), 10 Lawford Close, Wallington, Surrey SM6 9HA (Mail order only)**

COMPUTER COURSES
Take a micro break and come to Bournemouth. Mid-week and week-end courses, beginners to advanced basic.
Machine code and assembler courses available on request. Maximum 16 persons per course. Commodore 64's and BBC B's used or bring your own micro and we will adapt our course to your machine. For further information write to:
Micro learning centre, 10 St. Swithuns Rd South, Bournemouth.
Tele: (0202) 290677

TOP PROGRAMS — TOP DISCOUNTS
AMSTRAD: £5.95 Flight Path 737, House of Usher, Space Pilot. £7.95 Harrier Attack, Chess, Code Name Matt, Star Commando, Roland in Caves/On Ropes. SPECTRUM 48K: £4.95 Kokotoni, Wilf, Gilligans Gold, Kosmic Kanga, T.L.L. £5.95 Daley Thompsons Decathlon, Giants Revenge, Monty Mole, Micromega Games, Rapscallion, Black Hawk, Delta Wing. £6.95 Beachhead, Enduro, Project Volcano, Twin Kingdom Valley.
Plus many other programs for the Dragon 32 and Oric 48K (all Atmos compatible).
Cassette Recorder with counter (BBC, Elect, Oric, Spec.) £21.95; Quickshot II with interface (Kempston) for Spec. only £19.95.
Prices incl. p&p (Europe + 50, other + £1)
CH/PO to O. J. Software
(sae for list, state machine)
273 Mossy Lea Road, Wrightington, Wigan, Lancs., WN6 9RN.
Tel (0257) 421915 for price on latest software.

SPECTRUM CHESS
Dare you face The Turk

The original Turk was an eighteenth century automation, a life-size mechanical figure resplendent in Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.
OCP now offer you the twentieth century equivalent of that Turk – a chess-playing computer program. **The Turk challenges you to a game of chess!**

MANY OPTIONS INCLUDE:
- 6 Levels of Difficulty
- Demonstration Mode
- Board Editor
- Games Printout Facility
- Blitz Chess Against the Clock
- Two Player Mode
- Unfinished Games can be Stored
- Recommended Move

FULL INSTRUCTIONS PROVIDED
CHESS THE TURK ONLY £8.95
Post order to
Oxford Computer Publishing, P.O. Box 99, Oxford.
134/4

EDUCATION

Whether it be SPECTRUM, ZX81 or BBC B, we hold in stock probably the largest range of educational software available, currently in excess of 50 DIFFERENT EDUCATIONAL CASSETTES produced by the major software houses.
SAE for catalogue and SPECIAL OFFERS. Also GAMES TAPES: 3 for price of 2.
LOCATOR, 12, Fornhall Drive, Redbridge, Essex. IG4 5BN. Tel. 01-550 5575

SUPERIOR SPECTRUM TAPE COPIER

The **NEW 007 SPY** in the **ONLY** copier capable of copying even a full 48K Headerless program.

* Copies multipart programs all in one loading, automatically.
* Copies programs from 1 to 65279 bytes long. (Can yours)?
* Copies Headerless files up to a full 48K. (No other copier can).
* Copies **ALL** types, Basic, Code, Screen, Arrays, Headerless.
* Guaranteed easiest to use.

007 SPY IS JUST £3.95
(Europe +50p Other areas +£1.50)
(Please order as 007N)

ZX-GUARANTEED (Dept YC)
29 Chadderton Drive, Unsworth, Bury, Lancs. BL9 8NL.
Tel: 061-766 5712

CBM-64 tape copier. Makes back up copies of most programs available. Copies multi part programs one part at a time. £2.75. J. Hudson, 44 Nightingale Drive, West Ewell, Surrey. 454

EPSON FX-80 hi-res dot matrix printer for sale compatible with any computer owner upgrading hence £300 ono. Tel. 01-674 7785. Also Cumana 100K slimline disk-drive with psu/cable under guarantee £140. 442

A BBC B 'WORD PROCESSOR'
80 columns, editing, justification, saving, printing, inc. instructional suit Microline, Epsom or equivalent
Cassette £6.95 40 Track Disk £8.95
Send cheque/PO to: **CONE SOFTWARE**
11a Highview Rd. Sidcup, Kent DA14 4EX

DUST COVERS. Quality anti-static material. Spectrum £1.50, DK Tronic, Commodore, BBC Dragon £2.50 inc. p&p also available for printers cassettes disc drives etc. Computa Covers, 17 Lichfield St, Wolverhampton, West Midlands. 407

The Publishers take all reasonable care to ensure that classified advertisements are genuine, but readers must satisfy themselves that they will be obtaining what they require before entering into transactions, particularly if they involve large sums of money.

PROM SERVICES

ANALOGUE CONVERTERS for ZX81 and SPECTRUMOS
8 bit 8 channel input £23.95
8 bit 3 channel output £26.95
12 bit 8 channel input £57.95
3 slot motherboard £16.95
23/28 way edge cards 75p, connectors £2.50.
SAE for details of these and many other interfaces.
EPROM SERVICES
3 Wedgewood Drive, Leeds LS8 1EF.
Tel. (0532) 667183

TECTEL ROBOTICS
CONTROL BOARDS FOR HOME COMPUTERS

ORIC
ORIC DUUBRY £24
1 of 16 channel controller
ORIC ADC £34
Superfast 8 channel analog – digital scanner, 8 bit resolution.
ORIC I/O port £39
16 programmable channels
ORIC PRINTER £95
26 col, matrix, graphics double sized print, ink & ribbons.

ZX81
ZX81 DUUBRY £22.50
1 of 16 channel controller
SX81 ADC £34
Superfast 8 channel analog – digital scanner, 8 bit resolution.
ZX81 I/O port £34
16 programmable channels
ZX81 HI-RESOLUTION GRAPHICS £28
stunning results.

ITEXT SOFTWARE a new range of educational programs.

TODDLERS (pre school)
LEARN your ALPHABET
LEARN to COUNT
LEARN your COLOURS
LEARN your SHAPES
ABOUT the HOUSE
ABOUT the KITCHEN
ABOUT CLOTHES
£3.95 each

MUMS & DADS
ITEXT cookbook (English)
ITEXT cookbook (Chinese)
ITEXT cookbook (Italian)
ITEXT cookbook (Indian)
ITEXT Wine & Beer Making
ITEXT Cookbook Desserts
ITEXT Cookbook Confection
£5.65 each

Send cheque or Postal Order to:

TECTEL
Telford Opportunities Centre, Halesfield 14, Telford, Shropshire.
Tel. 0952-581738
P&P £1.50 for control boards £1 for tapes

FREE

with "Your Team" a Bobby Charlton Leather Match Ball worth £6.99

A must for all soccer enthusiasts

Yes, absolutely free for a limited period, with every copy of the program "Your Team" a real leather Match Ball autographed by Bobby Charlton (R.R.P. £6.99). "Your Team" is a database program to record and analyse your favourite teams match results, scores, attendances, statistics etc. All recorded in your clubs colours. Football league, Scottish league or your own team school or club can be kept season after season. Available for Spectrum, BBC, Electron, CBM 64 — £9.95 plus £1.00 p&p. Order today enclosing cheques/P.O. Access/Visa to: Bec Sports, Dept YC, Bec House, Highlands Ave, Northampton. Tel: 0604 499 246.

ATARI 400/600/800/XL

Cartridge Backup System
Backup 8/16K cartridge to tape and disc. 400/800 with 48K ram. De luxe version has gold edge blades on cartridge simulator.
Cartridge to tape & disc.....£15.00
de luxe £20.00
Spare simulator board.....£12.00
de luxe £17.00
XL Cartridge Backup
600 XL £25.00
800 XL £30.00
Specify Tape or Disk
Tape Duplicator
Duplicate almost any single or multistage tape. BASIC program, 48K ram recommended.
Tape Duplicator.....£6.00
Fast Loader
Reduce tape loading time of almost all of your single multistage tapes by up to 49%.
Fast Loader.....£6.00
600 XL Memory Upgrade
Upgrade your 16K to 64K. Complete kit with full instructions.
Memory Upgrade.....£75.00
Services
Listing and prom blowing services also available. Send for details.

Send large SAE for further details on any/all of the above and new products. All prices are inclusive of p&p. Utilities are for 400/800/XL/800XL unless otherwise specified.

S. Terrell
17 Cock Close Road, Yaxley, Peterborough PE7 3HJ

VIC TAPE BACKUP will backup most Vic-20 programs, in BASIC, machine-code, or both. Detailed instructions are printed on the card inlay. VIC Tape Backup is easy to use, with prompting by colour and by sound — when the colours change and the tone sounds, the copier is ready! Load errors are signalled, so poor originals can be tried again. Works with all memory configurations — one machine-language program allows automatically for memory differences! Send crossed cheque/PO for £7.95 to: **Level Software Ltd, PO Box 55, Shirley, SOLIHULL B90 4SL. Tel: 021-643 6728.**

WHAT PRICE SUCCESS FOR YOUR CHILD?
SPECTRUM/BBC

Carefully constructed programs, designed by teachers, to motivate and explain those difficult but essential concepts.
CHEMISTRY
1. Formula Package
Good Software Guide: "Simple, well thought out and well presented, it succeeds admirably in its intention"
2. Reactions
Micronet: "Well designed and executed"
3. Titration Package
PCW: "Excellent teaching aid"
NEW
4. Write Equations
Everything you need to know about writing Chemical Equations
5. MOLE: Chemistry Calculations
6. Periodic Table
Prints table! Explanations and educational game
PRIMARY
7. Countdown
5 superb programs: Numeracy skills, money, recognition, money, and association
All available for Spectrum 48K for £5.50 per program
Formula package also BBC B — Cassette: £8.50

CLOUD 9 software
CLOUD 9 SOFTWARE
Dept. YC8, 4 Dolvin Road, Tavistock PL19 9EA. 379

DISCOUNT MAIL ORDER SOFTWARE

ZAXXON	£4.15
TRASHMAN	£5.35
JET SET WILLIE	£5.35
FOOTBALL MANAGER	£6.25
MANIC MINER	£5.35
THE BOSS	£8.05
COSMIC CRUISER	£4.95
SNOOKER	£8.05

And more.
State title and machine
S.A.E. for lists.
Cheque/P.O. To Dept YC
Universal Publishing
65 Thurlow Park Rd.
London, SE21 8JP

SPECTRUM SOFTWARE CLUB!

LOWEST COST **FREE CASSETTE!**

* Hire and Exchange games from just 50p
* Buy new games at the best possible discounts
* Hundreds and hundreds of games to choose from
* Regular Newsletter with details of new releases etc
* Every new member gets a FREE BLANK CASSETTE!
* All the benefits of other clubs at HALF THE PRICE!

Send just £3.95 and we will rush you your Membership Kit and Free Cassette:

SPECTRUM SOFTWARE CLUB (YC)
287-291 HIGH STREET, EPPING, ESSEX CM16 4DA
(or send a stamp for catalogue)

SPECTRUM KOPYKAT

Simply the best. Copying any 16/48K Spectrum program is as easy as LOADing & SAVEing your own programs. Even unstoppable programs can now be backed-up onto a fresh tape. Only £4.95.
IT CAN EVEN COPY ITSELF

NEW
MICRODRIVE KOPYKAT

Transfer your cassette based software onto the ZX Microdrive RELOCATES programs, Stops & reveals programs ESSENTIAL for M/D transfer. Only £4.95.
Both with FREE Header Reader Despatched by Return of Post.

MEDSOFT
PO Box 84, Basingstoke, Hants

COMMODORE 64 CASSETTE COPIER

HARDWARE interface enables you to make back-up copies of ALL CMB64, VIC 20 & PET software (+ ALL types of 'turbo-loads').

ONLY £14.95 inc.
(Please add £1.00 for overseas orders)

For further details of this and other products, send large SAE to: **STAGSOFT, 23 Brock Rd., Chorley, Lancs. PR6 0DB.**

SPECTRUM & BBC POOLS PREDICTOR

FREE RACING ANALYSER

WITH **11,000 MATCH DATABASE**

BOTH PROGRAMS FOR ONLY **£8.99**

Now in its 3rd successful season. Mayday Software's Pools Predictor has been made even more powerful with a new and unique 11,000 match database. Seven separate forecasting techniques have been combined to give you the best forecasts yet. And, just as easy to use, is our new Racing Analyser. This uses the racecard from your daily paper to analyse any horse race — and it's yours for no extra charge!

MAYDAY SOFTWARE **181 Portland Crescent Stanmore, Middx. HA7 1LR.**

COMPUTER BOOKS

To help you write better programs
SPECTRUM

Adventures	£5.95
Machine Code Applications	£6.95
Master Your Microdrive	£6.95
COMMODORE 64	
Adventures	£5.95
Machine Code Master	£6.95
Advanced Programming Techniques	£5.95
DRAGON 32	
Games Master	£5.95

Other titles/machines also available SAE for details. Please add postage
1 book 75p, additional books + 30p each.
JAMES ELECTRONICS
P.O. Box 2 Rothwell, Leeds LS26 0UY.

SPECTRUM DATA-SAVE

If you own a 16/48K Spectrum you cannot afford to be without this program. DATA-SAVE ensures that you produce top quality BACK-UP copies of ALL types of programs and data files with ABSOLUTE SIMPLICITY. Advanced features include: Continuous Loading, Saving and Verifying of single and MULTIPART programs. MENU DRIVEN with comprehensive on-screen information. Plus FREE CHARACTER GENERATOR Program. Send cheque/PO for £6.00 to: GREEN BANK SOFTWARE, 2A, CURZON PARK SOUTH, CHESTER, CHESHIRE CH4 8AB.

Z80 ASSEMBLER

Specially written for AMSTRAD CPC 464
By the author of BEEBUG'S 'EXMON'

* FULL SCREEN EDITOR
* Disassembler & Hex Dump
* Allows freely mixed BASIC Machine Code (similar to BBC BASIC)
* Many directives and I/O options
* Expression evaluation
* Super fast — approx. 3,000 lines/min.
* Colour output
* Comprehensive instruction manual

SPECIAL INTRODUCTORY OFFER £11.60 (inc. p&p)
ARNOR LTD.
PO Box 619, London SE25 6JL.

Spectrum Markbook (48k)

A full teacher's markbook on computer. Holds all your classes, easily updated; automatic totals, percentages, orders of merit, mean & S.D. graphs etc.
Now completely revised. More features than ever. £6.50 with manual and demo.

Mentor Software
69 Beech Rd, Halton, Lancaster

VIC-20 Software Hire

Free membership. 500 Members. 100 titles from 50p per week. SAE for your free Membership kit to: **VSH (HCW), 242 Ransom Road, Mapperley, Nottingham.**

SINCLAIR ZX Spectrum 48K personal computer with Sinclair ZX printer. Various software. £110 ono. (0243) 554020. 426

TURN MACHINE-CODE INTO BASIC

Turn Machine-code into Basic? Yes you **CAN**. Long machine-code progs are nearly all, all or part Basic.

MY STOP-REVEAL TAPE WILL:

* **STOP** virtually **ANY** Spectrum programs, Basic, Code and even Headerless programs, protected or not, & **LIST**.

* **REVEAL** hidden Basic in machine code programs. (Could be clues in Adventure games).

* **LISTs** actual machine-code on your video.

Now you can **STOP, LIST, MODIFY, STUDY** most Spectrum programs at your leisure. Even 48K programs.

Includes: a **DISASSEMBLER, HEADER READER** and **SECRETS OF TRADE** pages explaining how professionals hide programs, and How to reveal them.
All for the price of one game!
Post £5.95 free
(Europe + 50p Elsewhere + £1.50)
392

KERR, 24/25 HIGH STREET, KING'S LYNN, PE30 1BP

FREE SOFTWARE . . . But how? You've got friends with computers . . . Show them our huge discount games lists. They like to save money, and you earn some too. That's all . . . and it doesn't cost you a thing. Interested . . . Yes . . . More details please.
TECHNIPLAY SOFTWARE

74 Dornoch Drive,
Hull HU8 8JL. 0482 712958

LYNX 48K & 96K

Quality software for your LYNX
RALLY BRITAIN — navigation game £5.95 (inc.). COCONUTS — animated word game £4.99 (inc.). DATAL — a sophisticated data storage and retrieval program. *Easy to use, fast, flexible and very friendly.* User manual includes Address Book, and Home Accounts. *A must for all LYNX owners at £19.55 + 45p p&p.* Send cheques/PO to:
ORIGINATION
Dept Y, 2-3 Forge Row,
Nr. Soudley, Cinderford,
Glos GL14 2UP.
or please send SAE for further details.

LOAD CORRECTLY

with the LOADMASTER
Set the volume control on your cassette recorder right EVERY time. Just plugs between recorder and computer. Price inc. p&p £11.49.
PROBEMASTER LTD.
23 The Ridgeway,
Cuffley, Potters Bar,
Herts. EN6 4BB.

CBM 64

BLACK OUT AND TURTLE TRIALS
Two brand new and exciting games for the Commodore 64. Only £5.99. Send cheques and PO's to:
T. Scallon Software
82 Sorbus Close,
Salford M6 5AR.

STOP—REVEAL

A unique cassette for the 48K Spectrum. Genuinely lets you:
1. STOP virtually all programs, BASIC, MACHINE-CODE and even HEADERLESS-FILES, protected or not.
2. REVEALs the hidden Basic in Machine-Code programs. (Could be clues in adventure games).
3. LISTS actual Machine-Code on your video.
Now you can STOP, LIST, MODIFY, STUDY most Spectrum programs at your leisure. (And cassette is Microdrive compatible).
Includes a DISSASSEMBLER so can even study Sinclair ROM, etc, plus the most Advanced HEADER-READER ever written, plus pages of SECRETS OF THE TRADE revealing professional methods used to hide lines/programs, etc.
YOU CANNOT GET A MORE POWERFUL CASSETTE
(Even STOPS/REVEALS programs which are a genuine 48K long)
POST **£5.95 FREE**
(Europe add £1. Other areas add £2)
KERR, 24/25 HIGH STREET,
KING'S LYNN, PE30 1BP.

BECOME A PROGRAMMER

Improve your prospects in the industry of the 80's. We'll develop your skills more quickly and more professionally with our home study Programming Course, based on Spectrum. Write for Free Brochure.
IDEAL SCHOOLS
Ref: YC4, Freepost,
Woking, Surrey GU21 4BR.

RETAILERS

For fast speedy distribution service contact Drake Distribution on 0752 500951/2

We can offer you:
- 24-hour delivery in UK
- The Best Discounts
- Starter packs available
- All the latest software
- Personal delivery service throughout the UK
- Export enquiries welcome
- 48-Hour delivery can be arranged

As retailers ourselves we know the titles that sell — Phone or write for a price list now.

DRAKE DISTRIBUTION
Unit 45, Enterprise Plymouth,
Somerset Place, Plymouth PL3 4BB

DISC DRIVES for your BBC Spectrum (interface available), Dragon, & TRS80. We stock the widest range of drives & media in the country. Best prices around. Over 60 models. For brochure ring Datafax Systems, Basingstoke 64187. 424

COMMODORE 64 SPECTRUM · VIC 20

(S)TOP SECRET(S) II
48K Spectrum/Commodore 64/Vic 20. Puts you back in **FULL control** of your **MICRO**. A machine code **UTILITY** to **STOP** most **basic/machine code** incl. HEADERLESS programs, protected or not, without crashes. If you can stop them you can learn their SECRETS/-LEARN/LIST/MODIFY. Ideal MICRO-DRIVE/DISK DRIVE companion. **PLUS** Mach. Code DISASSEMBLER. List Mach. Code/Basic/Hidden Basic/ROM. **PLUS** an advanced HEADER READER. **PLUS** HEX/DEC DEC/HEX converters. **PLUS** SECRET INFORMATION about how the professionals keep their secrets hidden. CASS-£5.95 DISK-£9.95 MICRODRIVE-£11.95. Previous customers EXCHANGE previous tape plus £1.50p for NEW copy.

BYTE BACK
Commodore 64/Vic 20
Complete companion to (S)TOP SECRET(S). A hardware/software package containing: (i) A **RESET** device which plugs into your micro, no mode needed. (ii) A m/code program which completely **RESTORES** programs after reset. (iii) A mach. code **ASSEMBLER**, enter mach. code easily in understandable form. IDEAL FOR MODIFYING or writing programs. (iv) A superb m/code DISASSEMBLER which lets you examine, and explains mach. code. **PLUS** with BYTE BACK it is virtually **impossible** to **CRASH** your own programs. CASSETTE-£6.95/DISK-£9.95.

SUPERKIT 64
Commodore 64 only
SUPERB TOOLKIT of m/code routines: Complete RE-NUMBER/AUTO LINE/-TRACE/FIND AUTO RUN/BLOCK DELETE/MEMORY SAVE and more. Software controlled flexibility, and at a sensible price. CASSETTE-£6.95/DISK-£9.95. With SUPERKIT 64, BYTE BACK and (S)TOP SECRET(S) you have about unbeatable STOPPING power and all the **EXTRA UTILITIES** for writing/modifying programs. SPECIAL DISCOUNT for COMMODORE OWNERS. Buy all three programs — £2.00 discount.
Eliminate C2N Datasette problems.

REKORDAKIT 64
HEAR your Datasette performing. Keep C2N in tip top condition. Simple to use plug-in device which reproduces audio output and a **TEST TAPE** to ensure tape heads are correctly set. £5.95.

REMEMBER State Computer
Cheque/PO to:
ASH BYPRODUCTS
PO Box 510
Birmingham B17 9ES.

COPYMATE TWO

COMMODORE 64 tape back-up utility. A professional product with an *EXTENDED RANGE* and the ability to *SAVE TO TAPE AND/OR DISK.* Supplied on a quality cassette with full instructions for only £5.75 or on disk for only £7.75.

64 MONITOR
For the CBM 64. Designed for both the beginner and expert m/c programmer. Supplied with a 40 page explanatory manual. 14 useful commands including a built-in assembler/disassembler. Tape only £5.95 or disk for £7.95.
Horizon Software
15 Bamburg Close
Danesholme, Corby,
Northants, NN18 9PA.

QL USER Guide Index. Separate index for each chapter plus universal index for rapid reference. £4 or £6 incl. postage. Dane Kurth, CH3292 Busseil, Switzerland. 428

SUPER BREAKER
For the Commodore 64, this utility will make back-up copies of tape programs onto tape or disk. Supplied with written instructions on tape at £4.99 inc. or on disk for £6.99 inc.
1541 DISC MANAGEMENT
This 20 function disk management utility includes features like edit track and sector, full disk back-up, protect/unprotect programs, enhanced and normal disk commands. Supplied on disk with comprehensive booklet for only £8.75 inc. cheque/PO to:
CLARK KENT SOFTWARE
26 North Cape Walk
Corby, Northamptonshire.

DISCOUNT software for Spectrum/CBM64/Atari/BBC/Electron/Amstrad. SAE for lists quote micro. Sunaro Software (YC1), PO Box 78, Macclesfield, Cheshire SK10 3PK. 427

Microdrive transfer listings for "TLL", "Full Throttle", "Lords of Midnight", "Chequered Flag" and "3D Tank Duel". 50p each SAE to Y. Russell, 16a Glenluce Rd., Blackheath, London SE3.

AMSTRAD, Atmos 8 Oric 1 software club. Best from the latest added monthly. SAE for details. 26 Beechley Drive, Cardiff, CF5 3SN. 429

AMSTRAD COMPUTER DUST COVERS
Either in one of two piece from matching proofed anti-static nylon. Piped in green with Amstrad CPC 464 printed on keyboard **£5.95.**
State 1 or 2 piece and for colour or mon.
BBD COVERS 39 Manse Cross, Wrightington WN6 9RP.

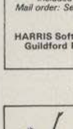
SHARP SOFTWARE

Superb new and original home, business and utility programs for the MZ-700 and MZ-711. Also local private tuition in programming from beginner to business level. For complete details (specify programs/tuition) send SAE to: Maysoft (DMB), 50 Thompson Avenue, Colchester, Essex CO3 4HW.

EUROPE QUIZ

for 16/48K ZX Spectrum.
Fascinating Maps Quiz — Educational and lots of fun — with stunning maps. Europe Quiz is suitable for all ages. Also included is "WORLD MAPS".
Mail order: Send cheque or PO for £4.50 inc. p&p to:

HARRIS Software, 7 Thorsden Court, Guildford Road, Woking, Surrey, GU22 7QS.



CRAZYHORSE SOFTWARE
presents
MAGNIFICENT SEVEN
Disc utilities for
CBM 64 1541
Fast Backup Format,
Most Errors 280 secs
Fast Format Less than 45 secs
File Copy, Fileclone,
Disc to Tape, Tape to Disc
Disc to Turbo to Disc
£19.55 inc p.p
7 Railway Mews, London W10
Trade Enquiries Welcome

GOOD IDEAS are welcome at GRIFFIN SOFTWARE GS

The leading educational software suppliers
If you think you have an exceptional educational program (basic or machine code) for any of the most popular home computers, we would like to hear from you.
Contact: Roger Blake
Griffin Software, Ealing Road,
Wembley, Middlesex, HA0 1HJ.
Tel: 01-997 3344
Fisons plc Scientific Equipment Division

AMSTRAD
ZEDIS . . . EDITOR and **DIS-ASSEMBLER** for the **Z80.** Includes full instructions for Dis-sassembling **ROMs.** £6.95 To **PRIDE UTILITIES, 7 Chalton Hts, Chalton, Luton, Beds.**

48K SPECTRUM ASSEMBLER & DEBUGGER

Easy to use, no new editors or monitors to learn, Menus to ASSEMBLE DIS-ASSEMBLE, TEST, SAVE, LOAD, DELETE. Microdrive and printer supported. Use assembler like BASIC, Testing — SINGLE STEP, TRACE, VIDEO GAMES TRACE, BREAKPOINT, NON-STOP CALLS, HISTORY. Dynamic displays — this and next instruction with addresses, current and last register value, stack contents, flags, selected memory bytes, all in hex and decimal. Special CONVERSATIONAL ASSEMBLY INSTRUCTION INPUT/EXECUTION with full displays, a unique testing and machine code learning aid. Cassette £9.95, Microdrive cartridge £13.95 with demonstrations.

Dept. YC, 45 Hullbridge Road, Rayleigh, Essex SS6 9NL. Send SAE for details.

U.S. GOLD

All American Software

The premier publishers of American Computer Software offer "Fantastic Opportunities" for

Assembly Language Z-80 Programmers

Translation coding from Commodore 64 to ZX Spectrum.
First class work will be highly rewarded with guaranteed payments.
Programming includes Arcade Games, Simulations Adventure, Strategy and War Games.

Write or phone now to Software Development Department, U.S.G, 6 Central Street, Manchester M2. or phone 061 832-6633

But hurry! Limited contracts left for this year.

Completed programs for Spectrum also considered.

COMMODORE 64 — AMSTRAD — MSX OWNERS

MIDLAND COMPUTER LIBRARY

1 All the latest titles on cassette, disc and cartridge
2 Hire your first two games absolutely free.
3 Life membership £6.00.
4 Hire charge from only £1 inc. p&p for full 7 days.
5 No limit to the amount of games you can hire.
6 All games originals with full documentation.
7 Games, Business and Educational software.
8 Return of post service guaranteed.
9 Lowest new hard and software prices in the UK.
10 Join now on money back guarantee.

Send cheque or postal order for £6 with your two selections or large SAE for further details to:

MIDLAND COMPUTER LIBRARY
The first and largest Commodore 64 library in the world
31 Evenlode Close, Lodge Park
Redditch B98 7NA
Telephone 0527 23584

ROAD RUNNER COMPUTERS

6 Litchton St., Barnstaple, Nth. Devon.

Streets ahead of others. Better prices, better service, latest software, including disk software. If you can't call at the shop, just phone Barnstaple 74663 for Mail Order which is second to none.

! NEW VERSION !

Would you like to transfer your Spectrum programs from
① MICRODRIVE TO MICRODRIVE ③ TAPE TO TAPE
② TAPE TO MICRODRIVE ④ MICRODRIVE TO TAPE

Then do it with

TRANS-EXPRESS

TAPE TO MICRODRIVE — MICRODRIVE TO TAPE

TRANS-EXPRESS is the most comprehensive package of four m/c utilities for transferring Spectrum programs. They are user-friendly, simple to use, reliable & very efficient.

They will enable you to transfer any kind of programs up to the full 48.0K length, TAPE TO M/DRIVE will also automatically, if necessary, modify, restructure and relocate both BASIC and M/C to run from m'drives.

You can buy any of the 4 programs for £5.50 or TAPE TO M/DRIVE AND M/DRIVE TO M/DRIVE together for £7.50, or all the 4 programs on a tape for £9.95 or on a m'drive cartridge for £14.95.

MICRODRIVE TO MICRODRIVE

Please send me a copy of **TRANS-EXPRESS** ①②③④ (Please tick where applicable) I enclose cheque/PO for ..... (Please add £1.00 for orders outside UK) YC

Name .....

Address 215

ROMANTIC ROBOT 113 Melrose Ave, London NW2

The Jet Set Willy editor. 100% machine code program. Will totally redesign Jet Set Willy and create an extra three rooms. £3.50 incl. p&p. Send cheques or postal orders to:

1 Rowan Place, Dundee, DD3 0PH

BRUNWORD

FOR THE MEMOTECH

* Wordprocessor for the MTX 500/512, requiring no additional hardware.
* Uses memory similar to discs. (MTX 500 — 7 pages. MTX 512 — 14 pages).
* Fast access to memory files (approx 1 sec) and no noticeable typing delay.
* TEXT mode with insert/overwrite, word wrap, continuous screen edit, full cursor control and right justify.
* ESCAPE mode based on key words but only the first letter is typed. SAVE, LOAD, DIRECTORY, GET from memory, MEMORY save, KILL, PRINT, TEAR, WEAVE, REMOVE, INITIALISE, CLEAR, ONSCREEN, FIND.
* Automatic formatting up to 130 columns, suitable for all printers.
* Printer controls can be embedded in the text (single character).
* ONLY £19.50 inclusive. (OR SEND FOR FULL INFORMATION).

BRUNNING SOFTWARE
34 HELSTON ROAD,
CHELMSFORD, ESSEX CM1 5JF.

QUICKBEAM SOFTWARE

presents

DICKIE DIVER
Daring Dickie Diver, Dives Deep to the Depths of the Dark Dingy Domain of the Deadly Demons. Will our hero, Dashing Dickie, Drown, or will he Dice with Death and Dodge the Demons. Discover the Undersea World of Dickie Diver. Swim through the Massive Cavern and collect the Oysters with which you have to buy your air. But beware of the Acid Plants and the Thingumies which thrive in the Dark Dingy Domain. A pure machine code arcade game for 1/2 players. Joystick/Keyboard options (Spectrum) **£5.95**

TERROR CASTLE
Dare you attempt this Adventure. Have you the nerve to set foot in Terror Castle. This spine chilling adventure is not for those of a nervous disposition or for people who are scared of things that go bump in the night.
Warning: Do not leave this game on grandma's chair. (Dragon 32, BBC Electron, Spectrum) **£5.95**

THE SHRUNKEN SCIENTISTS' QUEST
Can you imagine being only one inch tall, mole hills are like mountains, puddles are like lakes and every insect is a monster. Due to a scientific mishap this has happened to you. Your task, to get to the antidote. But how will you do it? A tough and addictive adventure that will not be solved in a day. Dragon 32, BBC) **£5.95**

SUPER DRAUGHTS
A version of the classic game with 10 levels, making it suitable for the beginner to the expert. (Spectrum, Commodore 64) **£5.95**

TOMBSTONE AND COD CREEK
Two classic games for the whole family. Many hours of entertainment for 1 to 4 players. Excellent value. (Dragon 32) **£5.95**

DUPLICAS
The Dragon 32 cassette copier. This copier will even make backups of the latest Dongle software. "Of the numerous back-up programs I have Duplicas outperforms them all" D.M. of Warrington. (Dragon 32) **£5.95**

Make cheques/PO payable to:
QUICKBEAM SOFTWARE
67 Old Nazeing Road, Broxbourne, Herts EN10 6RN.

SPECTRUM and DRAGON TAPE COPIER 5 and now MICRODRIVE 1

WE OFFER ON ALL PRODUCTS A FULL MONEY BACK GUARANTEE, an update service; and FULLY detailed instructions, with USER friendly programs. Match that!

TAPE COPIER 5 (TC5) makes BACK UP copies of ANY type of SPECTRUM (16/48K) program (incl headerless, m/c, unstoppable) easily with MANY unique features.

MAXIMUM 5 STARS from H.C. Weekly (just like GRAPHICS and SOUND TOOLKIT — £5.50)

- LOADS in all program parts CONTINUOUSLY — even without pressing a key. Other copiers require many loadings — MASSIVELY saving you time and trouble! Maxbytes even manages a working copy of the full 48k.
- MDrive — this extra option GENUINELY copies BASIC, M/CODE + arrays onto MICRODRIVE.
- Verifies. Repeat copies. Auto Abort. Program name plus HEADER data.
- Copies virtually ALL programs. UPDATE service for old customers to keep pace with latest developments £3.50 (£2 with mdrive) + SAE + old TAPE.

MICRODRIVE ONE (MD1)

48K Spectrum owners with mdrive can NOW transfer the MAJORITY of their programs (inc headerless, long programs, + those with LOW addresses — say 16384).

TC5 transfers the bytes; but MD1 has 5 programs to HELP YOU get them running + 2 "CAT" housekeeping programs. Includes advanced header reader, program analysis, and other programs that produce the m/code you need. Manual has examples/exercises. UNRIVALLED!

Spectrum T-Copier £4.50 (or £5.50 with mdrive option). Dragon Copier £6.99. Microdrive One £6.50.

OVERSEAS customers: add £1 Europe, £2 others for each product. Please send SAE for enquiries.

LERM, DEPT YC, 10 BRUNSWICK GDNS, CORBY, NORTHANTS.

It's easy to complain about advertisements. But which ones?

Every week millions of advertisements appear in print, on posters or in the cinema.

Most of them comply with the rules contained in the British Code of Advertising Practice.

But some of them break the rules and warrant your complaints.

If you're not sure about which ones they are, however, drop us a line and we'll send you an abridged copy of the Advertising Code.

Then, if an advertisement bothers you, you'll be justified in bothering us.

The Advertising Standards Authority.
If an advertisement is wrong, we're here to put it right.

ASA Ltd, Dept 2 Brook House, Torrington Place, London WC1E 7HN

This space is donated in the interests of high standards of advertising.

New Releases

of computer software for the CBM64 BBC, Spectrum, Atari, new list every to weeks. Also software for the TI99/4A, Dragon, Electron, Lynx, Sharp MZ700, Tandy, Vic 20, ZX81. Please state computer business and games software.

M. J. SEAWARD
St. Olafs Road, Stratton, Nr. Bude, Cornwall.

Very short but powerful programs
Strongly recommended by educational authorities

EDUCARE'S 50
Book of fifty programs for primary education

Spectrum ZX81 (1K) £5.95 BBC Micro/Electron £7.95

EDUCARE 139a Sloane St., London SW1X 9AY.

SELL IT WITH YOUR COMPUTER

CLASSIFIED ORDER FORM

Classified Rates

Linage: 50p per word (Min 20 words) — prepayable

Linage advertisers should complete the form provided in BLOCK CAPITALS. Phone number counts as 2 words. Name and address to be paid for if used in advertisement. Box Number if required is £4.00 extra.

Display — rates per scc (Min 2scc)

One insertion	:	£9.00
Three insertions	:	£8.70
Six insertions	:	£8.50
Twelve insertions	:	£8.00

Display advertisers should provide separate copy and preferably reserve space by phone (01-661 3036).

Method of Payment

Cheques etc. should be made payable to Business Press International Ltd. and crossed. I enclose herewith cheque/PO for

£.....

Please debit my Access/Visa Barclay Card/American Express/Diners Club Int'l as below

SIGNATURE

Post to:
Cut out the order form and return together with your remittance to: Classified Department, Your Computer, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. (01) 661 3036

Please insert the following advertisement in Your Computer Classified Section

					LINAGE
					£10.00
					£12.50
					£15.00
					£17.50
					£20.00
					£22.50
					£25.00

No. of insertions required ☐ Box No. required YES/NO

NAME *(Please include initials).* .....

ADDRESS .....

.....

.....

.....

Payment by credit card please state address card is registered

Daytime tel. no .....

THIS FORM SHOULD BE RETURNED BY 26th NOV. FOR JAN. ISSUE PUBLICATION

Company Registered Number: 151537 (England) Registered Office: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Hot lines

Acorn Computer
Telephone: Cambridge 0223-245200

Atari
Telephone: Slough 0753-24561

Camputers
Telephone: Cambridge 0223-315063

Commodore CBM
Telephone: Slough 0753-74111

Dragon Data
Telephone: Bridgend 0656-744725

Sharp
Telephone: Manchester 061-2052333

Sinclair
Telephone: Cambridge 0276-685311

Sord
Telephone: London 01-930 4214

Tandy Corporation
Telephone: Birmingham 021-5566101

Texas Instruments
Telephone: Bedford 0234-63211

DATEBASE

Local, national and international micro events are updated here. To publicise your event, phone Paul Bond on 01-661 3472.

NUMINE Conference

Network of Users of Micro computers in Nurse Education is holding a conference at Park Lane Staff Education Centre, Maghull, Liverpool, on December 3. Telephone 051 531 0022 for details.

School Computer Fair

For anyone involved in education, except, of course, the pupils. Takes place at Bloomsbury Crest, London from November 6-7, then ups stakes to Manchester from November 14-15. More details from Publishers' Association. Telephone 01-580 6321.

The Lord Mayor of Bradford, Councillor Mrs Olive Messer, opening Ram's new £250,000 headquarters aided by staff adopting IBM's national advertising Chaplin theme in celebration of Ram's appointment as IBM PC's first Yorkshire dealer.

Compec

November 13-16 at Olympia. The big business computing exhibition sponsored by Computer Weekly, among others. More details from Reed Exhibitions. Telephone 01-643 8040.

INDEX OF ADVERTISERS

6809 Colour Show 50
A
A & F Software 200
Acorn Computers 198/199
Activision 81/102
Addictive Games 219
Advance Technology 121
Adventure International 20
Amstrad 126/127
Anirog 34/239
Argus Press Software 54
Axis 36-39

B
Beebug 169
Betasoft 233
Beyond Software 82/83
Blaby 44
British Telecom (Firefly) 224/225
Buffer Micro 46
Bugbyte 235
Bulldog Software 22

C
CJE 238
Cambridge Micro Electric 48
Campbell Systems 72
Cases Computers Simulators 96
Classic Software 227
Cobalt Systems 145
Commodore 16-19/104/105
Compusound 7
Computer Games 118
Computer Link 35
Computermate 80
Corgi Books 232
Creative Sparks 86
Cumana 52
Currah Computers IBC

D
DACC 239
DK Tronics 151/220/221/237
Datastar 35
Datel 241
Dean Electronics 212
Domark 90
Downsway 206
Durrell Software 12/13

E
English Software
Everyday Electronics 112

F
Ferguson 192/193
First London Micro Show 132
Flexiwords 238
Frel Ltd 241
Frontrunner (K-Tel) 21/23

G
Galaset 7
Galatrek 214
Gilsoft 231

H
Haulsterm 10
Hewson Consultants 188
Hisoft 215

I
Ibico 233
Industrial Process 10
Innelec 15
Interceptor Micro 164
Interface 213

K
Kempston Micro 6
Kosmos 7
Kuma 125

L
LCL 227
LTS 215
Leasalink 154
Level 9 236
Llamasoft 24

M
Melbourne House 170/171/222/223
Memoco 203
Memotech 56
Mail Order Protection Scheme 214
Micro Answers 72
Micro Fast 132
Micro Markets 210/211
Micro Workshop 206
Micro-x 216
Microdeal 26
Micronet 800 8/9
Micropower 130/137/160/194
Microware 44
Miles Better Software 155
Mirrorsoft 113
Modular Resources 166

N
National Software Library 35
New Generation Software 209
Nordic Keyboards 4

O
Oasis Software 142
Ocean Publishing BC

P
PAS 216
PSS 11
PV Tubes 231
Phimag 186/187
Picturesque 238
Practical Computing 182
Praybourne 155
Print n' Plotter 204/205
Profisoft 180
Protek 58/64/94

Q
Quicksilva 116/117/178/179

R
Ram Electronics 66
Redhatch 46
Richard Wilcox 5
Romac 84
Rose Software 229
Rotronics 168/174

S
Saga Systems 159
Sarasoft 209
Sci (UK) 69
Selec Software 44
Silicon Joy 228
Skywave 135
Softcentre 72
Softsel 226
Software Communications IFC
Software Farm 14
Software Library 146
Southern Software 196
Spectadraw 48
Spectre 132/206
Spectrum 27-33
Statesoft 140
Stonechip 234
Swanley Computers 212
Sybex 185

T
TEC 212
Tatung 230/108
Tektonic 155
Thoughts & Crosses 207
Toshiba 99
Touchmaster 136/167
Touchmaster 177
Tremiver 208
Triptych 7[illegible]
Tritonic

U
US Gold 92/114/149/152/172/191/202
Ultimate Play the Game 111/138/139
University Software 10

V
Virgin Books 146
Virgin Games 227/229/231/233
Visionstore 218

W
WG Cox 89
WH Smiths 156
Walker Computers 48
Walters Computer Systems 162
Wizard 214
Worldwide Computers 209

Z
ZX Microfair 217

FUN WITH SPEECH 64!

Speech Synthesiser for the Commodore 64

SPEECH 64 for the Commodore 64 is ready to talk immediately on power-up, has an infinite vocabulary and extra BASIC commands. Retailing at only **£29.95**, ***SPEECH 64***'s advanced features will give you, your family and friends lots more fun with your computer! Its sister unit μSPEECH — for the Sinclair Spectrum — is a smash hit in the UK and over 10 other countries, and has been awarded the CTA 'Product of the Year' accolade.

SPEECH 64 is easy to use! It needs no software to be loaded, it does not steal RAM from the BASIC operating system, or stop arcade style action.

With extended BASIC commands like SAY and its Text to Speech facility ***SPEECH 64*** can be programmed in plain English, just like this:

SAY "to say anything you want"

You can choose from two different voices, each with programmable intonation, and other commands control the voicing of keys as they are pressed — a useful educational aid for young children.

SPEECH 64 comes complete with full documentation and two free full colour posters. Watch out for ***SPEECH 64*** as it appears in retail outlets nationwide — or use the order form below, at no extra cost.

CURRAH

Computor Components Ltd

To: SPEECH 64 Offer, P.O. Box 1, Gateshead, Tyne & Wear, NE8 1AJ

Please Supply ..... **SPEECH 64** unit(s) at £29.95 each incl. VAT & P&P

GC1

Name (please print) .....

Address (please print) .....

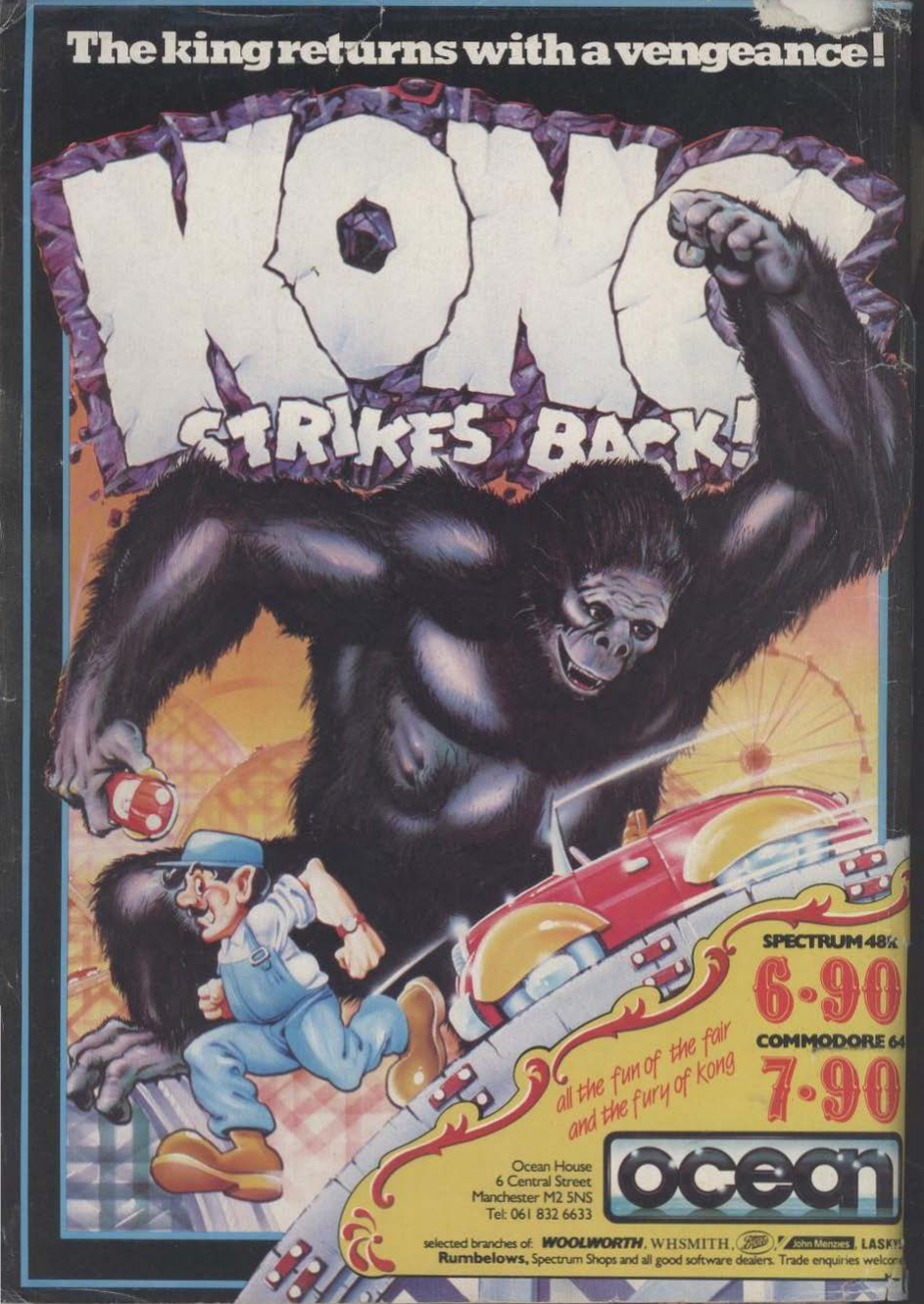
..... Postcode .....

I enclose a cheque/PO payable to 'SPEECH 64 Offer' value £ .....

or debit my Access/BarclayCard No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Signed (credit card orders not accepted unless signed) .....

Credit Card Hotline 091 - 482 4683 Please allow 28 days for delivery. Offer valid UK only


The king returns with a vengeance!
KONG
STRIKES BACK!
SPECTRUM 48K
6·90
COMMODORE 64
7·90
all the fun of the fair
and the fury of kong
Ocean House
6 Central Street
Manchester M2 5NS
Tel: 061 832 6633
ocean
selected branches of: WOOLWORTH, WHSMITH, John Menzies, LASKY'S
Rumbelows, Spectrum Shops and all good software dealers. Trade enquiries welcome